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NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT FOR FISCAL YEAR 1986

APRIL 16, 1985.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

[To accompany H.R. 1210]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology to whom was referred the bill (H.R. 1210) to authorize appropriations to the National Science Foundation for the fiscal years 1986 and 1987, and for related purposes, having considered the same, report favorable thereon with amendments and recommend that the bill as amended do pass.

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The amendments are as follows:

Strike out all after the enacting clause and insert in lieu thereof the following:

That this Act may be cited as the "National Science Foundation Authorization Act for Fiscal Year 1986".

Sec. 2. (a) There are authorized to be appropriated to the National Science Foundation, for the fiscal year 1986, the sums set forth in the following categories:

(1) Advanced Scientific Computing, $46,230,000.
(2) Astronomical, Atmospheric, Earth, and Ocean Sciences, $372,170,000.
(3) Biological, Behavioral, and Social Sciences, $272,050,000.
(4) Engineering, $170,070,000.
(5) Mathematical and Physical Sciences, $428,970,000.
(6) Scientific, Technological, and International Affairs, $38,360,000.
(7) Program Development and Management, $69,900,000.
(8) Science and Engineering Education, $82,000,000.
(9) United States Antarctic Program, $120,100,000.

(b) Notwithstanding any other provision of this Act, from the amounts authorized under subsection (a)—

(1) not less than $1,000,000 shall be available for the ethics and values in science and technology program; and

(2) not less than $3,000,000 shall be available for the policy research and analysis program.

(c) In the obligation, use, and expenditure of the amounts appropriated for Biotic Systems and Resources under the authority provided in subsection (a)(3) and for Atmospheric Sciences under the authority provided in subsection (a)(2), emphasis shall be placed on basic scientific research to support a better understanding of the phenomena that contribute to acid rain.

Sec. 3. Of the funds authorized to be appropriated in section 2, no funds shall be expended towards closure of a National facility without appropriate scientific review, including review by the National Science Foundation's appropriate advisory committee or committees and the National Science Board.

Sec. 4. Appropriations made under the authority provided in sections 2 and 6 shall remain available for obligation for periods specified in the Acts making the appropriations.

Sec. 5. From appropriations made under the authorizations provided in this Act, not more than $3,500 may be used for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the Foundation. His determination will be final and conclusive upon the accounting officers of the Government.

Sec. 6. Besides the sums authorized by section 2, not more than $1,000,000 is authorized to be appropriated for the fiscal year 1986 for expenses of the National Science Foundation incurred outside the United States, to be drawn from foreign currencies that the Treasury Department determines to be excess to the normal requirements of the United States.

SEC. 7. (a) Funds may be transferred among the categories listed in section 2(a), so long as the net funds transferred to or from any category do not exceed 10 percent of the amount authorized for that category in section 2.

(b) In addition, the Director of the Foundation may propose transfers to or from any category exceeding 10 percent of the amount authorized for that category in section 2; but an explanation of any such proposed transfer must be transmitted in writing to the Speaker of the House, the President of the Senate, and the appropriate authorizing committees of the House and Senate, and the proposed transfer may be made only when 30 calendar days have passed after the transmission of such written explanation.

SEC. 8. The National Science Foundation is authorized to design, establish, and maintain a data collection and analysis capability in the Foundation for the purpose of identifying and assessing the research facilities needs of universities. The needs of universities, by major field of science and engineering, for construction and modernization of research laboratories, including fixed equipment and major research equipment, shall be documented. University expenditures for the construction and modernization of research facilities, the sources of funds, and other appropriate data shall be collected and analyzed. The Foundation, in conjunction with other appropriate Federal agencies, shall conduct the necessary surveys every 2 years and report the results to the Congress. The first report shall be submitted to the Congress by September 1, 1986.

SEC. 9. (a) Section 6 of the National Science Foundation Act of 1950 is amended—

(1) by striking out "(a)" after "SEC. 6."; and

(2) by striking out subsection (b).

(b) Section 14(b) of such Act is amended—

(1) by striking out "the Director, the Deputy Director, nor any Assistant Director" and inserting in lieu thereof "the Director nor the Deputy Director"; and

(2) by striking out "the Director, the Deputy Director, or any Assistant Director" and inserting in lieu thereof "the Director or the Deputy Director".

(c) Section 5316 of title 5 of the United States Code is amended by striking out "Assistant Directors, National Science Foundation (4).".

SEC. 10. (a) Section 4(e) of the National Science Foundation Act of 1950 is amended by striking out "by registered mail or certified mail mailed to his last known address of record" in the last sentence.

(b) Section 5(e) of such Act is amended to read as follows:

"(e) The Director may make contracts, grants, and other arrangements pursuant to section 11(c) only with the prior approval of the Board or under authority delegated by the Board, and subject to such conditions as the Board may impose. Any delegation of authority or imposition of conditions under the preceding sentence shall be effective only for such period of time, not exceeding two years, as the Board may specify, and shall be promptly published in the Federal Register and reported to the appropriate authorizing committees of the Congress. On October 1 of each odd-numbered year the Board shall submit to the Congress a concise report which explains and justifies any actions taken by the Board under this subsection to delegate its authority or impose conditions within the preceding two years.".

(c) Section 12 of such Act is amended—

(1) by striking out "(a)" after "SEC. 12."; and

(2) by striking out subsection (b).

(d) Subsections (a) and (b) of section 9 of such Act are amended to read as follows:

"(a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.

"(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering.".

(e)(1) Section 14 of such Act, as amended by section 9(b) of this Act, is further amended—

(A) by striking out subsection (b);

(B) by redesignating subsections (c) through (i) as subsections (b) through (h), respectively; and

(C) by adding at the end thereof the following new subsection:

"(i) Information supplied to the Foundation or a contractor of the Foundation by an industrial or commercial organization in survey forms, questionnaires, or similar instruments for the purposes of subsection (a)(5) or (a)(6) of section 3 may not be disclosed to the public unless such information has been transformed into statistical or aggregate formats that do not allow the identification of the supplier. The names of organizations supplying such information may not be disclosed to the public.".

(2) Sections 3(b) and 15(b)(1) of such Act are each amended by striking out "14(g)" and inserting in lieu thereof "14(f)".

(f) Section 10 of the National Science Foundation Authorization Act, Fiscal Year 1978 (Public Law 95-99), is repealed.

(g) Section 6(a) of the National Science Foundation Authorization Act, 1976 (Public Law 94-86) is amended—

(1) by striking out "not to exceed $50,000 per year for a period not to exceed three years" in the last sentence; and

(2) by adding at the end thereof the following new sentence: "The National Science Board will periodically establish the amounts and terms of such grants under this section.".

(h) Section 6 of the National Science Foundation Authorization Act, Fiscal Year 1978 (Public Law 95-99), is repealed; and sections 7, 8, 9, 11, 12, 13, and 14 of such Act are redesignated as sections 6 through 12, respectively.

(i) Section 9 of the National Science Foundation Authorization Act for Fiscal Year 1980 (Public Law 96-44; 42 U.S.C. 1882) is amended by inserting "and the National Science Board" after "the Director of the National Science Foundation".

SEC. 11. (a) The National Science Foundation Act of 1950 (42 U.S.C. 1861 through 1875) is amended as follows:

(1) Section 3(a)(1) (42 U.S.C. 1862(a)(1)) is amended—

(A) by striking out "engineering,";

(B) by inserting after "other sciences," the following: "and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering."; and

(C) by striking out "such scientific and educational activities" and inserting in lieu thereof "such scientific, engineering, and educational activities".

(2) Section 3(a)(3) is amended—

(A) by inserting "and engineering" after "scientific"; and

(B) by inserting "and engineers" after "scientists".

(3) Section 3(a)(4) is amended—

(A) by inserting "and engineering" after "scientific"; and

(B) by inserting "and engineering" after "sciences".

(4) Section 3(a)(5) is amended by inserting "and fields of engineering" after "sciences".

(5) Section 3(a)(6) is amended by striking out "technical" each place it appears and inserting in lieu thereof "engineering".

(6) Section 3(a)(7) is amended by inserting "and engineering" after "scientific".

(7) Section 3(b) is amended by inserting "and engineering" after "scientific" each place it appears.

(8) Section 3(c) is amended—

(A) by inserting "and engineering" after "scientific" in the first sentence; and

(B) by inserting "and engineering research" after "applied scientific research" in the second sentence.

(9) Section 3(d) is amended by striking out "basic research and education in the sciences" and inserting in lieu thereof "research and education in science and engineering".

(10) Section 3(e) is amended by inserting "and engineering" after "sciences".

(11) Section 4(c) (42 U.S.C. 1863(c)) is amended—

(A) by inserting "and engineering" after "scientific" in clause (3) of the first sentence;

(B) by inserting "and engineers" after "scientists" in the second sentence; and

(C) by inserting "the National Academy of Engineering," after "National Academy of Sciences,", and inserting ", engineering," after "scientific", in the third sentence.

(12) The first sentence of section 10 (42 U.S.C. 1869) is amended by striking out "scientific study or scientific work in the mathematical, physical, medical, biological, engineering, social, and other sciences" and inserting in lieu thereof "study and research in the sciences or in engineering".

(13) Section 11 (42 U.S.C. 1870) is amended—

(A) by inserting "or engineering" after "scientific" each place it appears in subsections (c) and (d);

(B) by striking out "technical" and inserting in lieu thereof "engineering" in subsection (g); and

(C) by striking out "scientific value" and inserting in lieu thereof "scientific or engineering value" in subsection (g).

(14) Section 12 (42 U.S.C. 1871), as amended by section 10(c) of this Act, is further amended by inserting "or engineering" after "scientific".

(15) Section 13(a) (42 U.S.C. 1872(a)) is amended—

(A) by inserting "or engineering" after "scientific" each place it appears in the first two sentences;

(B) by inserting "or engineers" after "scientists"; and

(C) by striking out "scientific study or scientific work" and inserting in lieu thereof "study and research in the sciences or in engineering".

(16) Section 13(b) is amended by inserting "or engineering" after "scientific".

(17) Section 14 (42 U.S.C. 1873), as amended by sections 9(b) and 10(e) of this Act, is further amended—

(A) by inserting "or engineering" after "scientific" each place it appears in subsection (e); and

(B) by striking out "technical" in subsection (f) and inserting in lieu thereof "engineering".

(18) Section 15(b) (42 U.S.C. 1874(b)) is amended—

(A) by striking out "technical" in paragraph (1) and inserting in lieu thereof "engineering"; and

(B) by inserting "or engineering" after "scientific" in paragraph (2).

(b) Section 2(b) of the National Science Foundation Authorization Act, 1976 (42 U.S.C. 1869a, Public Law 94-86) is amended by inserting "or engineering" after "science" each place it appears.

(c) Part B of the National Science Foundation Authorization and Science and Technology Equal Opportunities Act (42 U.S.C. 1885 to 1885d, Public Law 96-516) is amended as follows:

(1) Section 31 is amended by striking out "Technology" and inserting in lieu thereof "Engineering".

(2) Section 32(a) (42 U.S.C. 1885(a)) is amended—

(A) by striking out "technology" and inserting in lieu thereof "engineering"; and

(B) by striking out "scientific talent and technical skills" and inserting in lieu thereof "scientific and engineering talents and skills".

(3) The first sentence of section 32(b) (42 U.S.C. 1885(b)) is amended—

(A) by striking out "skills in science and mathematics" and inserting in lieu thereof "skills in science, engineering, and mathematics";

(B) by striking out "technical" and inserting in lieu thereof "engineering";

(C) by striking out "scientific literacy" and inserting in lieu thereof "scientific and engineering literacy"; and

(D) by striking out "technology" and inserting in lieu thereof "engineering".

(4) The second sentence of section 32(b) (42 U.S.C. 1885(b)) is amended—

(A) by striking out "highest quality science" and inserting in lieu thereof "highest quality science and engineering"; and

(B) by striking out "technology" and inserting in lieu thereof "engineering".

(5) The third sentence of section 32(b) (42 U.S.C. 1885(b)) is amended by striking out "technology" and inserting in lieu thereof "engineering".

(6) Section 33 (42 U.S.C. 1885(a)) is amended—

(A) by striking out "technology" and "technical" each place they appear and inserting in lieu thereof "engineering";

(B) by inserting ", engineering," after "science" in paragraph (2);

(C) by inserting "and engineers" after "scientists" each place it appears;

(D) by inserting "and engineering" after "science" in paragraph (10); and

(E) by striking out "science, engineering, and technology" in paragraph (11) and inserting in lieu thereof "science and engineering".

(7) Section 34 (42 U.S.C. 1885(b)) is amended—

(A) by striking out "science education" and inserting in lieu thereof "science and engineering education"; and

(B) by striking out "technology" and inserting in lieu thereof "engineering".

(8) Section 36 (42 U.S.C 1885(c)) is amended—

(A) by striking out "TECHNOLOGY" in the heading and "Technology" and "technology" each place they appear, and inserting in lieu thereof "ENGINEERING", "Engineering", and "engineering", respectively; and

(B) by striking out "scientific engineering, professional, and technical" and inserting in lieu thereof "scientific, engineering, and professional".

(9) Section 37(b) (42 U.S.C. 1885(d)(b)) is amended—

(A) by striking out "technical" each place it appears and inserting in lieu thereof "engineering"; and

(B) by striking out "Technology" in paragraph (3) and inserting in lieu thereof "Engineering".

(10) The heading of such part B is amended by striking out "TECHNOLOGY" and inserting in lieu thereof "ENGINEERING".

SEC. 12. Within 90 days after the date of the enactment of this Act the Director of the National Science Foundation shall review the recommendations of the President's Private Sector Survey on Cost Control and such other recommendations as may be included in the OMB report "Management of the United States Government—1986", and shall submit a report to the Speaker of the House of Representatives, the President of the Senate, and the appropriate Committees of the House and Senate on the implementation status of each such recommendation which affects the National Science Foundation and which is within the authority and control of the Director.

Amend the title so as to read:

A bill to authorize appropriations to the National Science Foundation for the fiscal year 1986, and for other purposes.

I. SUMMARY

BUDGET ACTIONS

Budget total

The President's budget included a request for $1,569,399,722 for the National Science Foundation in fiscal year 1986 in new obligational authority plus a proposed deferral of $31,450,278 from fiscal year 1985 to fiscal year 1986.

H.R. 1210, as reported requires that of the funds authorized, no less than $1.0 million be available for the ethics and values in science and technology program and no less than $3.0 million be available for the policy research and analysis program.

OTHER ACTIONS

(A) The bill as reported by the Committee includes the following requirements:

(1) That emphasis will be placed on basic scientific research to support a better understanding of the phenomena contributing to acid rain.

(2) That NSF will conduct a study of the research facilities needs of universities.

(3) That appropriate scientific review, including review by the appropriate NSF advisory committee(s) and the National Science Board, will be conducted before the closure of any National facility.

(4) That the NSF Director will report to the Congress on those recommendations pertaining to the Foundation by the President's Private Sector Survey on Cost Control and the OMB report entitled "Management of the U.S. Government in 1986."

(B) The bill as reported by the Committee amends the National Science Foundation Act of 1950 as follows:

(1) To permit the Foundation to initiate and support fundamental engineering research and engineering education programs.

(2) To provide greater flexibility in establishing special commissions by the National Science Board and in providing membership for such commissions.

(3) To remove provisions banning National Science Foundation employees from owning patents on inventions resulting from NSF work. The Foundation performs no in-house research, and the provision has never been needed.

(4) To remove an unnecessary provision that senior Foundation officials must be full-time employees.

(5) To remove the requirement, considered obsolete, that members of the National Science Board be notified of meetings by registered or certified mail.

(6) To delete the requirement that Assistant Directors of the Foundation be appointed by the President and confirmed by Senate.

(7) To redefine the procedure by which authority could be delegated by the National Science Board to the NSF Director.

(8) To waive the requirement that information supplied to the Foundation or a contractor of the Foundation in surveys or questionnaires be made public; and provides that such information may be disclosed only when put into formats that do not allow for identification of the supplier.

(9) To remove the limit on the amounts and terms of the Waterman Award.

(10) To require the National Science Board, along with the NSF Director, to keep the appropriate Congressional Committees fully informed of NSF activities.

(C) Two sections are deleted from Public Law 95-99, the National Science Foundation Authorization Act of 1978, to remove unnecessary codification, as follows:

(1) Section 6, regarding the National Resource Centers, now covered by superseding law.

(2) Section 10, regarding conflict of interest, superseded by the Ethics in Government Act.

(D) Additional concerns and views of the Committee are reflected in the Committee Views section of this report.

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to the National Science Foundation for fiscal year 1986 in the amount of $1,599,850,000 out of money in the treasury not otherwise appropriated and $1,000,000 for fiscal year 1986 in foreign currency which the Treasury Department determines to be in excess to normal requirements of the United States as follows:

Budget activities

	Authorization, fiscal year 1986
Research and related activities:	
Advanced scientific computing	$46,230,000
Astronomical, atmospheric, Earth, and ocean sciences	372,170,000
Biological, behavioral, and social sciences	272,050,000
Engineering	170,070,000
Mathematical and physical sciences	428,970,000
Scientific, technological, and international affairs	38,360,000
Program development and management	69,900,000
Science and engineering education	82,000,000
U.S. Antarctic Program	120,100,000
Special foreign currency	1,000,000
Total	1,600,850,000

NATIONAL SCIENCE FOUNDATION BUDGET COMPARISONS
ACTIONS BY THE COMMITTEE ON SCIENCE AND TECHNOLOGY

[Authorizations in millions of dollars] [1]

Activities	Current fiscal year 1985	Administration request, fiscal year 1986	Committee recommendation (H.R. 1210)	Changes from administration proposal
Research and related activities:				
Advanced scientific computing	$41.5	$46.2	$46.2	0
Astronomical, atmospheric, Earth, and ocean sciences	351.7	372.2	372.2	0
Biological, behavioral, and social sciences	252.0	272.0	272.0	0
Engineering	150.0	170.1	170.1	0
Mathematical and physical sciences	396.6	429.0	429.0	0
Scientific, technological, and international affairs	44.5	38.4	38.4	0
Program development and management	70.7	69.9	69.9	0
Subtotal, research and related activities	1,307.0	1,397.8	1,397.8	0
Science and engineering education	82.0	50.5	[2] 82.0	+31.5
U.S. Antarctic Program	110.9	120.1	120.1	0
Special foreign currency	2.8	1.0	1.0	0
Total	1,502.7	1,569.4	[2] 1,600.9	+31.5

[1] Dollar amounts have been rounded.
[2] Includes $31.5 million carryover from fiscal year 1985.

II. COMMITTEE VIEWS

1. SCIENCE AND ENGINEERING EDUCATION

Committee view

Even though Science and Engineering Education (SEE) at the National Science Foundation is a relatively small component in the national effort in education, its impact can be substantial. The Committee is dedicated to supporting the Foundation as it carries out its mandate from the National Science Foundation Act (42 USC 1862) to "recommend and encourage . . . National policies for the promotion of . . . education in the sciences" and "to initiate and support . . . programs to strengthen science education at all levels." Thus, the Foundation plays a critical role as the Nation strives to restore the scientific literacy of its citizenry and to renew the pool of technically trained manpower needed to maintain U.S. competitiveness and national security.

The launching of Sputnik by the U.S.S.R. inspired the U.S. to embark on a national effort to upgrade the Nation's abilities in technical fields. Unfortunately, this effort has not been sustained and the United States has suffered a steady decline in scientific literacy and technical capabilities of its population. This trend has permeated the Nation's entire education system from elementary schools to graduate schools. Declining student capabilities in math and science, severe shortages of qualified mathematics and science teachers, and a dwindling number of qualified faculty at colleges and universities all indicate the need for vigorous action. The Committee expects the Foundation to use its resources, although relatively limited, in a creative and energetic fashion to respond to these disturbing trends.

In this context, the Committee is troubled by the proposed deferral of $31.5 million from fiscal year 1985 to fiscal year 1986. In the Committee Report accompanying the fiscal year 1985 NSF Authorization Act (H. Rept. 98-642) the Committee clearly expressed its expectation that the practice of carrying over funds from one year to another would end in fiscal year 1985. In that Report the Committee stated: "However, the Committee reminds the Foundation that the funding level authorized for a specific year was intended as the level of expenditure for that fiscal year. The Committee expects that the practice of carrying over large sums from one fiscal year to another will not continue beyond fiscal year 1985." At the same time, the Committee has been very tolerant of the carryover of funds for the last two years in light of the conditions created by the dismantling and subsequent reestablishment of the SEE Directorate. Unfortunately, a third straight year of carryover could have a detrimental effect on the effectiveness and reach of these important programs. The Committee, therefore, expects the Foundation to obligate all of the funds appropriated for the SEE Directorate in fiscal year 1986. Further, the Committee anticipates the long-range strategic plan for the SEE Directorate promised to the Committee by May 31, 1985 and encourages the Foundation to move expeditiously on designating a contractor for a management study of the SEE Directorate.

The Committee wishes to specifically explain its intention regarding the authorization level for the SEE Directorate in fiscal year 1986. The total authorization level for fiscal year 1986 is $82.0 million. This authorization level is identical to the amount which NSF requested for obligation in fiscal year 1986 and is identical to the fiscal year 1985 appropriation. The total authorization is intended to include both new obligational authority ($50.5 million) in addition to funds carried over from fiscal year 1985 to fiscal year 1986 ($31.5 million).

Although no Congressional appropriation has been targeted specifically for NSF activities under the Education for Economic Security Act (Public Law 98-377), the Committee recognizes there are substantial similarities between the NSF programs and those in the Act. Thus, the Committee encourages the Foundation to carry out the spirit of the Act while it expands its activities in the areas of teacher training and retraining, as well as materials development for class instruction.

The Committee reiterates its expectation expressed in the fiscal year 1985 Committee Report (H. Rept. 98–642) that the Foundation prepare and implement a plan for the development of a community college program. Although such plans were not included in the budget request for fiscal year 1986, the Committee wishes to express its expectation that activities targeted toward community colleges and undergraduate colleges will be included in plans for future years.

The Committee notes that funding for the graduate fellowships program has been held at fiscal year 1985 levels. In the last two years significant progress has been made to strengthen this program by increasing the stipend and the cost-of-education allowance. In spite of this laudable progress, the program continues to lag behind other Federal agency fellowship programs and private sector opportunities. Since the funding level for the graduate fellowships program is equal to that of fiscal year 1985 and the amount of the total award was increased in fiscal year 1985, the end result is a reduction in the number of new fellowships from 600 in fiscal years 1984 and 1985 to 560 fellowships in fiscal year 1986. Although the Committee's primary intention was to increase the level of support for each fellowship so as to be more competitive with other fellowship programs, the Committee did not intend a reduction in the total number of fellowships granted. In future years, the Committee encourages the Foundation to increase the amount for graduate fellowships so as to both increase the individual stipend and cost-of-education allowance, as well as the total number of fellowships granted.

The Committee concurs with recommendations that the Foundation should increase utilization of telecommunications technologies to meet many of its education objectives. Children's television programs such as "3–2–1 Contact", "Sesame Street" and "The Brain" have achieved remarkable and cost-effective results in science education in the home and in the classroom. Other areas such as junior high school mathematics and in-service teacher education could benefit from this approach.

The Committee expects the Foundation to enhance support for the use of television for science and mathematics education. Further, the Committee feels that support for innovative technologies such as computers and interactive video is clearly appropriate and should be pursued. The Foundation should review Federal efforts to promote these and other innovative technologies and take the necessary steps to incorporate them into precollege programs. In this area the Committee expects the Foundation to sustain and expand its activities directed at support of informal education; specifically, the Teacher Enhancement and Informal Education program, Museums, nature centers, and other sources of informal education can play a constructive role in teaching scientific concepts to precollege students. Also, these informal education centers offer solid opportunites for upgrading the subject knowledge and teaching skills of precollege science and mathematics teachers. Although funding for activities in the Teacher Enhancement and Informal Education Program for fiscal year 1986 is at a level equal to that of fiscal year 1985, the Committee expects that such activities will receive a growing emphasis in the future in light of the proliferation of science musuems and nature centers throughout the country.

The Committee urges the Foundation to initiate and support programs for gifted and talented students. The Committee feels that the Foundation can play an appropriate leadership role in this area by supporting the study and possible implementation of such a program. A number of initiatives, such as those at Duke University and Johns Hopkins University, are targeted for students with exceptional study skills and potential in science and mathematics. Such activities can help tap the nation's reservoir of exceptional young talent and increase the number of future scientists and mathematicians. The Committee also urges the Foundation to support a long-term study of the results of such programs in order to provide a basic understanding of the conditions under which exceptionally talented students are identified and cultivated. Finally, the Foundation might consider a national talent search in order to broaden the scope of this program.

2. ETHICS AND VALUES IN SCIENCE AND TECHNOLOGY

Committee view

The Committee directs NSF to make available $1.0 million to continue support for research in ethics and values in science and technology. This effort, known as the EVIST program, has been terminated as a line item in the Scientific, Technological, and International Affairs (STIA) Directorate in the Foundation's budget request for fiscal year 1986. The Foundation believes that the concept of the program has been effectively demonstrated, and that EVIST-type projects can now compete in the mainstream of the research programs. Also, NSF notes that many professional societies and private foundations are now demonstrating increased interest in ethical and value issues and in supporting research of this nature. While this may be true, the Committee believes that this type of research is important, and at present NSF is considered to be the only source of Federal support for many of these research activities. Supplemental support by the National Endowment for the Humanities, which in 1981 amounted to about $800,000, has decreased sharply since then and, it is understood, will no longer be available.

These kinds of research projects might be supported across the research directorates, because of the awareness of their value and need raised through the EVIST program in STIA. The Committee encourages NSF to find innovative means to leverage the resources for ethics and values research in conjunction with the resources and activities of other directorates within NSF. At the same time, the Committee directs that any such research projects be tracked and monitored to ensure that the minimum level of support specified within the authorization is being maintained.

Discussion

The EVIST program came into existence in 1975 in response to growing concerns among scientists, the public, the media, and Congress over the ethical and social implications of advances in science and technology. Since that time, this small program has made many important contributions to our understanding of the humanistic and ethical dimensions of science and technology. Many feel, in fact, that EVIST has become a symbol of this nation's commitment to scientific progress for human wellbeing.

EVIST projects have investigated ethical issues in medical experimentation and the management of technological innovation; in agriculture research policy; in openness and secrecy in science; in animal research; in computers, technology and privacy; in risk analysis and cost-benefit analysis; in workplace health and the management of health hazards, among many others. These are not concerns that will go away; they must continue to be addressed through NSF support.

3. POLICY RESEARCH AND ANALYSIS

Committee view

Policy Research and Analysis (PRA) is currently a subactivity of the Scientific, Technological, and International Affairs (STIA) Directorate. In previous years PRA conducted and supported both intramural and extramural research and analysis on national science and technology policy issues. Research results and related analysis provided a source of information for use by decision makers in the Executive Office of the President, Federal agencies, scholars in the various subdisciplines, and the general public.

The fiscal year 1986 request for PRA is $2.0 million, or 57.6 percent less than the expenditure planned for fiscal year 1985. This reduction reflects a decision to focus PRA activities on intramural analysis and those policy-related questions raised by NSF, the National Science Board, and other Executive agencies.

The Committee finds the decision to reduce support for policy research and analysis inconsistent with the growing national need to maximize the benefits and minimize the disbenefits of science and technology to society. Therefore, the Committee specifies that not less than $3.0 million of the total amounts authorized should be available for policy research and analysis. The Committee directs NSF to allocate this $1.0 million increase above the fiscal year 1986 request to extramural policy research, with special emphasis on risk assessment.

In addition, the Committee emphasizes the crucial role NSF has played in funding scientific risk assessment research through PRA. With the ever increasing demand for the integration of sound scientific risk assessment into the regulatory process, the Committee believes that such efforts should not suffer under the budget cuts, as proposed. Furthermore, the Committee does not look upon the distribution of the risk assessment program to the various research directorates of NSF to be, in any way, a dilution of the efforts in this field. The National Science Foundation is the one agency of the Federal government which has an intellectual mandate to perform these types of studies in an objective manner. Therefore, the Committee directs the Foundation to strongly support the continuation of work underway at NSF in the field or risk assessment.

The Committee does not necessarily intend that the $1.0 million increase should be incorporated into the PRA subactivity in STIA. The Committee encourages NSF to find innovative means to leverage the additional resources for policy research in conjuction with the resources and activities of other Directorates within NSF, while insuring appropriate accountability for funds allocated for policy research and analysis.

4. ACID PRECIPITATION

Committee view

The Committee recognizes the contribution NSF has made in the past with funding basic science research leading to a further understanding of the chemical interactions which create acid rain. Further, NSF through their support of atmospheric, biological and environmental research has assisted in broadening the understanding of possible environmental effects associated with acid precipitation.

The Committee, therefore, directs the Foundation to continue its support of basic research and in addition, to extend this effort to explore the effects of this phenomena on the global ecosystem.

5. REVIEW OF NATIONAL FACILITIES CLOSURE

Committee view

H.R. 1210, as amended, includes a provision which requires that no funds shall be expended towards the closure of a national facility without appropriate scientific review, including review by the National Science Foundation's appropriate Advisory Committee or Committees and the National Science Board.

This concern has emerged in the area of ground-based astronomy. The Committee continues to support NSF's role as the major agency in Federal support for ground-based astronomy research. The Committee wishes to assure that any decision to discontinue or sharply curtail operations at one of the world's foremost national solar observatories, the Sacramento Peak Observatory at Sunspot, New Mexico, be given the appropriate analyses and review, as called for in this bill.

The Committee feels there will be a continued and important role for ground-based astronomy even as we take advantage of new space-based resources. In terms of fiscal restraint, it is of critical importance that the use of ground-based and space-based resources be coordinated to assure the continued world preeminence of U.S. astronomical research.

6. RESEARCH FACILITIES, EQUIPMENT, AND INSTRUMENTATION

Committee view

The Committee applauds NSF for continued and increased support for research facilities, equipment, and instrumentation at universities and research centers. The Committee is pleased that NSF plans to continue the College Science Instrumentation Program initiated in fiscal year 1985 to provide matching funds for the acquisition of modern instrumentation at four-year colleges to improve their capabilities in science and engineering instruction. In addition, NSF's initiative to provide support for equipment and instrumentation to meet the needs of experimental research through the provision of multiuser equipment at the university department level will assist in making more effective use of limited resources.

However, the Committee realizes that high priority and sustained effort over the next several years are necessary to revitalize and modernize our university research facilities. The lack of state-of-the-art research facilities has a substantial adverse effect on research productivity, innovation, and training in the scientific and engineering community in the United States. The Committee has received convincing testimony that a serious and growing problem exists and is concerned that the Federal Government does not have in place an on-going analytical system to assess the extent of the research facilities deficit by major fields of science and engineering. In order to develop cost effective approaches and solutions to the research facilities shortfalls, the Committee believes a better understanding of the national dimension of the problem and the consequences of the capital deficit are necessary.

Therefore, H.R. 1210 authorizes and directs NSF to design, establish, and maintain a permanent data collection and analysis capability to assess the research facilities needs of universities. This continuous assessment should provide baseline data necessary to formulate appropriate solutions to documented needs, as well as trend data necessary to evaluate outcomes of approaches implemented and to formulate future approaches. The data will also enhance the ability of the Congress and the Executive Branch to respond to changing needs and to more effectively balance available resources among the various components of university research facilities, i.e., construction and modernization, fixed equipment, and major research instrumentation.

The Committee reiterates its desire that information on research facilities, provided with annual justification of estimates of appropriations, be organized in a consistent and clear fashion to illustrate the direction and scope of activities over a period of years. In particular, a definition of each support category (facilities construction, equipment, and instrumentation) and expenditures and estimates for each category classified by activity and mode of support would be helpful to the Committee.

The Committee supports the June, 1984 statement of the National Science Board on Academic Science and Engineering: Physical Infrastructure. The outcome of the recommendation that NSF, "Develop for consideration by the National Science Board a pilot program providing support for renovation and new construction as part of the Foundation's FY 1986 initiatives in Biotechnology, Engineering Research Centers, and Advanced Scientific Computing, the entire process subject to peer review" will be of special interest to the Committee.

Discussion

The mandate for an assessment of research facilities needs is not to be interpreted or used as a means to decrease or delay funding in this area in fiscal year 1986 or beyond. The Committee is aware of current shortages for research facilities, but believes systematic information is needed to understand the magnitude of the problem and to formulate sound solutions over time.

The Committee realizes that Federal agencies other than NSF have responsibility for support of university research facilities. However, the Committee believes NSF should assume a lead role in coordinating policies and programs designed to enhance research facilities and in assessing the needs of universities in this regard. Thus, the Committee was pleased to see NSF take the lead in the Ad Hoc Interagency Steering Committee on Academic Research Facilities initiative to conduct an in-depth study of research facilities needs. However, the Committee is concerned that the Office of Management and Budget (OMB) prohibited implementation of the survey. To ensure that the Federal Government has a permanent data collection and analysis capability on research facilities needs, the Committee expects NSF, in cooperation with other mission agencies, to establish this capability as an integral component of the Foundation's Science Resource Studies subactivity.

7. ASSISTANT DIRECTOR APPOINTMENTS

Committee view

The NSF executive structure currently includes the positions of Director, Deputy Director, and seven Assistant Directors—one for each of the following: Astronomical, Atmospheric, Earth and Ocean Sciences (AAEO), Biological, Behavioral, and Social Sciences (BBS), Engineering (ENG), Mathematical and Physical Sciences (MPS), Science and Engineering Education (SEE), Scientific, Technological, and International Affairs (STIA), and Administration. The National Science Foundation Act of 1950 specifies that the Director, the Deputy Director, four Assistant Directors, and the 24 members of the National Science Board shall be appointed by the President. The Committee notes with concern that over the past several years numerous Assistant Director positions have remained in "acting" status for extended periods of time while awaiting nomination of a Presidential appointment. For example, at the present time, the individuals assigned to the positions of Assistant Director for AAEO and Assistant Director for MPS have each been in "acting" status for approximately two years while simultaneously carrying out the functions of AAEO Deputy Assistant Director and Division Director for Physics, respectively.

Several witnesses, including a former NSF Director, indicated that having top level operational positions filled in an acting capacity for extended periods of time was a serious problem and inconsistent with good management principles and with formulation and implementation of long-range policy. Witnesses suggested that appointment of the Assistant Directors by the Director of the Foundation, rather than through the Presidential appointment process, could considerably reduce the time necessary to fill vacancies of senior operational positions.

Experience suggests that the Director has been able to effectively and completely delegate responsibility to the non-Presidential Assistant Directors. In addition, the Committee has not found that the prestige of the agency or of individual officers depends in any significant way on Presidential appointment. Finally, the positions do not require incumbents to establish or communicate the policies of the President, except as expressed in NSF programs and budgets.

The Committee appreciates the importance of Presidential appointments. However, in view of the fact that 30 positions within the NSF policy and management structure are Presidential appointments, the Committee believes that removing this requirement for four Assistant Directors will not significantly reduce control over senior administrators and the policy-setting body of NSF. Furthermore, the removal of the requirement could assist the Foundation in accomplishing its designated mission in a timely fashion.

Thus, the Committee amended the Act to remove the requirement that four Assistant Directors be appointed by the President with the advice and consent of the Senate. In the absence of this requirement, the Committee expects the Director, with the advice of the National Science Board, to appoint all Assistant Directors under the authority of section 14(a). The Committee recommends all seven of the Foundation's present Assistant Directors become noncareer positions in the Senior Executive Service.

8. DELEGATION OF AUTHORITY BY THE NATIONAL SCIENCE BOARD

Committee view

The Committee congratulates the National Science Board (NSB) for its initiative to pursue a course of action to move away from reliance on approval of awards as the primary mechanism for NSB oversight of NSF programs. The Committee is pleased to cooperate with the NSB to develop legislative language which would enhance the Board's oversight capability while maintaining authority for the commitment of NSF resources through contracts, grants, and other arrangements. To achieve this goal, the Committee and the NSB find it necessary to replace any dollar limits on the Board's power to delegate award-approval authority to the NSF Director with requirements that the Board must publish specified conditions under which award-approval authority would be delegated to the Director.

By way of background, the original NSF Act required that the Board approve all awards. As the Foundation grew and the requirement became impractical, the Board obtained in 1959 authority to delegate award-approval authority to the Director. The current provision, enacted in 1968, imposed statutory limits on the Board's power to delegate award-approval authority to the Director. The authority was identical to the limits the Board was then placing on the authority it had delegated. Those limits which remain in effect at the present time are found in Section 5(e) [42 U.S.C. s. 1864(e)] which reads:

> (e) The Director shall not make any contract, grant, or other arrangement pursuant to section 11(c) without the prior approval of the Board, except that a grant, contract, or other arrangement involving a total commitment of less than $2,000,000 or less than $500,000 in any one year, or a commitment of such lesser amount or amounts and subject to such other conditions as the Board in its discretion may

> from time to time determine to be appropriate and publish in the Federal Register, may be made if such action is taken pursuant to the terms and conditions set forth by the Board, and if each such action is reported to the Board at the Board meeting next following such action.

H.R. 1210, as amended by the Committee changes the statutory language to read:

> (e) The Director may make contracts, grants, and other arrangements pursuant to section 11(c) only with the prior approval of the Board or under authority delegated by the Board, and subject to such conditions as the Board may impose. Any delegation of authority or imposition of conditions under the preceding sentence shall be effective only for such period of time, not exceeding two years, as the Board may specify, and shall be promptly published in the Federal Register and reported to the appropriate authorizing committees of the Congress. On October 1 of each odd-numbered year the Board shall submit to the appropriate authorizing committees of the Congress a concise report which explains and justifies any actions taken by the Board under this subsection to delegate its authority or impose conditions within the preceding two years.

The Committee intends that the document specifying the conditions of the delegation of award-approval authority to the Director will also include the rationale for any delegation of authority and specific tasks the Board intends to undertake in lieu of exercising its authority to review commitments proposed by the Director. The Committee expects the report required of the Board every two years to explain and justify any actions taken by the Board to delegate its authority, and to analyze the effectiveness of the conditions, under which award-approval authority was delegated, in enhancing the Board's oversight capability. The Committee anticipates that such analyses will serve as the basis on which the Board makes determinations regarding: (1) the conditions under which award-approval authority will be delegated to the Director in the following two year period; (2) and the specific tasks the Board will undertake to exercise its oversight and policy-setting functions.

9. PROGRAM DEVELOPMENT AND MANAGEMENT

Committee view

The Foundation's budget estimate for fiscal year 1986 includes a net reduction of $0.3 million dollars in Program Development and Management (PDM). The reduction will decrease the portion of the total resources expended on administrative activities. The intent is to streamline operating costs for administration of program responsibilities through increased personnel productivity and systems improvement.

The Committee applauds NSF's initiative to enhance productivity and management efficiency. The Committee encourages the Foundation to continue to explore the use of innovative approaches and technologies designed to improve NSF's overall productivity, especially techniques for increasing the efficiency of the proposal processing and awards review systems.

The Committee recognizes that in some situations administrative costs, such as Federal salary scales, may be beyond the control of the Foundation. Likewise, the Committee recognizes that investments for the development of potential approaches for streamlining procedures and for assessing research needs to guide resource expenditures must be made prior to realizing the benefits of the expenditure. Thus, the Committee urges the Director of NSF to use the discretionary authority available to augment the PDM budget, if necessary and consistent with established research priorities, to further improve the efficiency and effectiveness of the operations and management of NSF.

10. MANAGEMENT INFORMATION SYSTEM

Committee view

The Committee has maintained a continuing concern over the Foundation's capacity to access, summarize and manage information about proposal review and award processes, the characteristics of researchers and reviewers, and characteristics reflecting the impact of policies and procedures implemented by the Foundation. The availability of accurate and reliable information of this kind is vital to the management of the Foundation, the setting of priorities, and the evaluation of progress in achieving established targets and goals.

The Committee commends NSF for recent actions to enhance the capability and effectiveness of the Foundation's Management Information System (MIS). The Committee urges NSF to continue to modify and improve the system until a viable and state-of-the-art MIS is in place. The Committee anticipates the MIS will be able to demonstrate this improved capability by generating, as a minimum, reports in the following areas: the numbers of female and minority peer reviewers and principal investigators; average grant amounts for female, minority and handicapped principal investigators in the aggregate and by discipline; numbers of international awards, by country and by discipline; percentages of international grants awarded through bilateral agreements and through the regular programs; percentages of international awards going to direct research, travel and personnel support; geographic distribution of research funding; percentages of grant funds going to facilities construction, fixed equipment, instrumentation, personnel, overhead and direct research costs by discipline, by individual award, institutional grants, center and project grants, and overall.

11. NSF ROLE IN ENGINEERING RESEARCH

Committee view

The Committee believes that the amendment to the NSF Organic Act (Section 11 of the Authorization bill) will bring science and engineering closer together in the Federal structure. Since both are necessary ingredients for technological growth they warrent close attention from the Foundation. It is the Committee's intent to emphasize and strengthen the Foundation's role in supporting academic research and talent in both science and engineering. This will avoid any divisive or counter-productive partition.

Discussion

While the Committee approves of the new initiatives in the Engineering Directorate it also believes that the Foundation's basic mission statement should reflect the current status of engineering.

In the 98th Congress, the Full Committee and the Congress adopted an amendment to the NSF Organic Act (Public Law 81-507, as amended) in order to reflect an increased emphasis on fundamental engineering at the Foundation. Since this amendment did not become law, it was again proposed by the Foundation and approved by the Committee. The amendment adds a new function to NSF's mission which authorizes the initiation of fundamental engineering research and education parallel to current NSF functions relating to basic science research and education. The amendment also inserts references to engineering and various fields of engineering throughout the Act to parallel references to science. The Committee understands that Section 11 of the authorization bill has the support of the Director of the National Science Foundation, the National Science Board and a variety of prominent professional and academic organizations.

12. ENGINEERING RESEARCH CENTERS

Committee view

The Committee feels that engineering education and research are key elements in meeting our nation's technological challenge. The Committee expects the Centers will offer teachers, researchers, and students the truly multi-disciplinary experiences necessary to advance the field of engineering in a changing technological environment. Further, the Committee expects the Centers to continue to offer opportunities for close interaction between universities and industry, as well as provide undergraduate and graduate students with "hands on" engineering education. Such strong linkage between interdisciplinary research and education can have a positive impact on new and developing areas.

In general, the Committee expects the Foundation to focus the attention of the Centers on a diverse array of engineering disciplines. Specifically, the Committee hopes the Centers will conform with the original intent of facilitating a truly cross-disciplinary approach in order to advance basic engineering research, as well as foster new applications in a wide range of fields.

13. ADVANCED SCIENTIFIC COMPUTING

Committee view

The goals of the Advanced Scientific Computing (ASC) program are to provide high-quality access to advanced computational facilities (supercomputers/very-high performance computational equipment) to all segments of the science and engineering research community supported by NSF. The specific objectives of the program are: (1) to encourage development of academically oriented computational facilities, including state-of-the-art computational equipment; (2) to provide the large-scale computational resources essential to the development and training of skilled computational scientists and engineers; and (3) to extend and develop the use of necessary networks and communications systems for access to computing facilities.

The ASC program began in fiscal year 1984 at a level of $6.0 million to provide access to advanced computational resources. The fiscal year 1985 budget request of $20.0 million proposed to extend and expand the program to provide access to advanced computers, for appropriate networking capability, and to support such local user needs as equipment, software, communications costs, remote workstations, local area networks, technical support and maintenance.

By all accounts, including a report of the NSF Advisory Committee for Advanced Scientific Computing Resources, a $20.0 million initiative was inadequate to stimulate all components of a viable ASC program, and address both the immediate and long-term computing needs of the scientific and engineering community. Thus, the Congress appropriated an additional $20.0 million to support this activity in fiscal year 1985. In addition, the fiscal year 1984 Supplemental Appropriations Act provided NSF $1.5 million to reimburse NASA for costs to transfer a Class VI computer and peripheral equipment to an institution of higher education.

The Committee congratulates NSF for the timely and competent manner in which the ASC program was expanded and increased resources, beyond the level requested, were expended. In fiscal year 1985 the program includes support for six Interim Centers available to the academic research community, the establishment of three National Centers and an experimental center. In addition, plans to make the supercomputer from the NASA inventory available to university researchers are well underway.

The Committee recognizes that the $4.8 million increase, for a total of $46.2 million, in fiscal year 1986 is extremely limited in view of the need to bring the centers funded in fiscal year 1985 to full operation, upgrade the NASA supercomputer to the current state-of-the-art supercomputer, to develop a national scientific research network, and to continue support for research necessary to improve supercomputer software productivity. All of these activities must be done in harmony in order to receive full advantage from the fiscal year 1985 investments. As the Committee cautioned last year, if a viable network is not established, centers cannot be accessed, and vice versa. In addition, national networks and centers cannot become truly "national" unless resources are available to enhance the local university computing infrastructure.

The Committee appreciates the fact that NSF established the present National Centers through government-university-industry partnerships. The Committee strongly encourages NSF to develop innovative strategies to encourage state and local governments and the private sector to participate in the ASC program to stretch the resources available to achieve the goals of the program.

The Committee urges NSF to make full use of any cost-benefit advantage which may be realized by providing the National Center, which will be selected to incorporate the NASA supercomputer assets, with immediate resources to upgrade the equipment and services consistent with the other National Centers funded by NSF. The Committee also encourages NSF to ensure, to the greatest extent possible, that all of the National Centers receive support within a timeframe which will provide the maximum cost advantage in achieving the short- and long-term goals specified for each center.

Unless the National Centers are given adequate resources to serve a broad geographic area and a variety of research needs, the continuation or expansion of the national center concept could be jeopardized. The products and services provided by the National Centers must be accessible, of high quality, and responsive to the research needs of numerous disciplines in order to minimize the desire and perceived need for every university or discipline to have a dedicated facility in close proximity.

14. PRESIDENTIAL YOUNG INVESTIGATOR AWARDS

Committee view

The Committee continues to support the Foundation's Presidential Young Investigator (PYI) program. This matching fund program was initiated in fiscal year 1984 and 200 awards were made in each of the first two years. The program supports five years of research by outstanding young PhDs near the beginning of their academic careers, with the goal of helping universities attract and retain exceptionally talented individuals.

The Committee notes with concern that the number of new awards planned for fiscal year 1986 has been reduced to 100. The original goal of the PYI program was to name 200 new investigators each year until a steady level of 1000 researchers with PYI support was reached. The Committee has supported this Foundation initiative strongly, and feels that the reduction in new awards would symbolize a reduction in the priority assigned by the Foundation to the revitalization of research in the nation's scientific community. Accordingly, the Committee recommends that the Foundation consider innovative ways to extend the NSF budget so the PYI program could be restored to its initially planned levels.

The Committee also notes that very few of the 400 awards given so far have been in the field of behavioral and social sciences. Although the majority of faculty shortages may occur in other fields, the Committee has repeatedly expressed the view that behavioral and social sciences should not be excluded from this award program. Considering the symbolic importance of the awards in focusing national attention on the benefits of science and engineering research, and in providing a desirable goal for talented young people, the Committee strongly urges the Foundation to extend PYI program participation to all fields of science receiving Foundation support.

The Committee appreciates the Foundation's efforts to enhance private sector participation in the matching fund component of the PYI program. High priority should be given to broadening the scope and level of private sector participation in the program. The Committee recommends that NSF, through public relations and media events, publicize the award recipients and industry contributors to enhance both public and private sector understanding of the benefits of the program. The Committee requests that NSF report progress made in obtaining matching funds for the fiscal year 1986 program.

15. ASTRONOMY: THE IMPORTANCE OF THE VERY LONG BASELINE ARRAY

Committee view

The Committee strongly supports the Foundation's plan to initiate construction of the Very Long Baseline Array (VLBA) radiotelescope system in fiscal year 1985. Further, the Committee authorizes $11.5 million in fiscal year 1986 for VLBA construction, as proposed by the NSF. NSF now plans a five-year funding schedule for VLBA construction, with completion anticipated in 1991 at a cost of approximately $69.0 million. While the Committee understands that overall budgetary pressures have obliged the NSF to stretch out VLBA construction, the Committee urges the Foundation to prevent further schedule slippage, which will increase total construction costs and will delay the start of new and important astronomy research.

Discussion

The report of the Astronomy Survey Committee of the National Academy of Sciences (Astronomy and Astrophysics for the 1980's) contains a clearly prioritized list of new instruments needed to make further progress in the field. Construction of the VLBA is the highest priority item for ground based astronomy. The report describes the importance of the VLBA as follows (p. 136):

> The VLB Array will produce high-quality radio images capable of resolving features down to 0.3 milliarcsecond (the size of a dime in New York as seen from Los Angeles). This is a hundred times better angular resolution than that of any other image-forming telescope at any wavelength and will yield detailed new radio images of a wide range of astronomical objects at the frontiers of modern astrophysical research. These include quasars and the nuclei of galaxies, features of interstellar molecular clouds, the center of our Galaxy and a variety of energetic Galactic objects such as x-ray, binary, and flare stars. The high angular resolution of the VLB Arrary will permit the direct study of small-scale structure surrounding the central regions of quasars and stars in the process of formation. Through the method of statistical parallaxes, it will furthermore permit direct measurements of distances to many objects throughout our Galaxy and even to some in nearby galaxies. *The VLB Array can also be applied to important problems in earth science (including precision geodesy and geophysics), to the navigation of interplanetary space craft, and to tests of the General Theory of Relativity* (emphasis added).

Internationally, there is considerable interest in the very long baseline interferometry technique. The U.S. is the acknowledged leader, and other countries, such as Italy and Australia, are even now building smaller arrays of telescopes which are designed to be used in conjunction with the VLBA, enhancing its capability even more. They are looking to the U.S. for continued direction and leadership. The technology for implementing the VLBA system is ready. In anticipation of a starting date in fiscal year 1985, a management and construction team has been assembled and is ready to begin. Construction of the ten large antennas will account for one-third the cost of the project, and a very favorable contract for this work has been negotiated. Past experience with the Very Large Array construction lends confidence that the National Radio Astronomy Observatories and NSF will be able to build the VLBA on time and within cost. Substantial delays at this stage will negate much of the careful preparation that has already been carried out.

16. BIOLOGICAL BEHAVIORAL, AND SOCIAL SCIENCES

Committee views

The Committee supports the 8 percent increases in the budget for the Biological, Behavioral, and Social Sciences (BBS) Directorate. The proposed increase of 19 percent for the Social and Economic Sciences subactivity is commendable and consistent with the Committee's recommendations over the past several years.

However, the behavioral and social sciences still lag behind the biological aspects of the programs in this directorate, as special emphasis is placed on emerging fields such as biotechnology research. For instance, in the Behavioral and Neural Sciences subactivity, the largest portion of the increase ($1.8 million out of $2.76 million) will be used to support research in neuroscience, to continue studying the structure, function and development of the nervous system. By contrast, cognitive science, which supports research in learning, memory, language, and human behavior, received an increase of only $350,000. In the Social and Economic Sciences subactivity, most of the $5.38 million increase will be used for economic research, with emphasis on data base development, methodological research, and instrumentation for the analysis of large scale data bases.

The Committee would caution against any further erosion of the behavioral and social sciences, especially support for investigator projects in basic research. The importance of the work of scientists trained in these fields becomes ever more apparent in our increasingly complex society. The Committee urges NSF to consider these factors when setting priorities to achieve "appropriate balance" in the various programs in BBS.

The Information Science and Technology (IST) subactivity in BBS has also been of special interest to the Committee over the past several years. The Committee continues to recognize the high return that investments in research to improve fundamental knowledge about the nature of information and the way it is generated, structured, represented, manipulated, and used can have for all scientific disciplines and the well being of society.

The Committee appreciates the fact that NSF increased the resources for the IST subactivity for fiscal year 1985 beyond the minimum level specified by the Committee to approximately 45 percent above the level expended in fiscal year 1984. The Committee is concerned that the benefits achieved by the fiscal year 1985 increase will be seriously eroded by the limited increase of $0.6 million or 6.7 percent proposed for fiscal year 1986. The Committee encourages NSF to continue incremental increases for the IST subactivity, since NSF is the principal Federal source of support for fundamental investigator-initiated research in information science and technology.

The Committee commends the progress being made in the Executive Branch through the Office of Science and Technology Policy (OSTP) to coordinate those Federal agencies involved in research on biotechnology and the formulation of federal regulations. On December 31, 1984, OSTP issued a notice in the Federal Register making public a proposal for a coordinated framework for regulation of biotechnology. It was the purpose of that notice:

> to provide a concise index of U.S. laws related to biotechnology, to clarify the policies of the major regulatory agencies that will be involved in reviewing research and products of biotechnology, to describe a scientific advisory mechanism for assessment of biotechnology issues, and to explain how the activities of the Federal agencies in biotechnology will be coordinated.

While NSF is not directly affected by the vast majority of Federal biotechnology statutes (public law), all agencies are required to adhere to provisions under the National Environmental Policy Act (42 U.S.C. 4321-4361), the Endangered Species Act of 1973, as amended (16 U.S.C. 1536) and the "Exotic Species" Executive Order 11987. The Committee is confident that NSF will adhere to any and all applicable provisions within these statutes.

In addition, the Committee believes NSF can play a significant role in contributing to the scientific assessment of risks associated with biotechnological innovation, as well as a better understanding of the environmental effects of the release of genetically engineered organisms into the environment.

Therefore, the Committee encourages the Foundation to maintain excellence in the field of molecular biology and biotechnology research as well as continuing to serve in an advisory capacity as a member of the Cabinet Council Working Group on Biotechnology through the OSTP.

Finally, the Committee once again expresses its support for the Postdoctoral Research Fellowships in the Plant Biology and Environmental Biology Program. Fiscal year 1986 will be the third year that this program has been in operation. The Committee wishes to reiterate that this postdoctoral program is a strong link between the broad range of biological and physical phenomena which could contribute to plant science research. Since this program was originally proposed for five years, the Committee will be interested in learning from NSF in fiscal year 1987 on the success of this initiative.

17. EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH

Committee view

The Experimental Program to Stimulate Competitive Research (EPSCoR) was developed by the National Science Foundation in response to concern over the geographical distribution of NSF awards and the desirability that all States be competitive in at least a few fields of science and engineering. For five years, beginning in 1980, NSF made awards of $2.5 million to $3.0 million annually to support research at universities in five States that ranked among the lowest in total Federal research funding. The awards were made to support state-wide research improvement plans; the five States chosen were Arkansas, Maine, Montana, South Carolina, and West Virginia.

NSF proposed to phase out the EPSCoR program at the end of fiscal year 1984. Testimony and other information received by the Committee, including an NSF interim report, pointed to EPSCoR's success with a relatively small investment of funds, and the Committee directed NSF to reinstate the program, at a level of $3.0 million for fiscal year 1985. In response, and with a $1.0 million fiscal year 1985 appropriation by Congress for this purpose, NSF has begun the planning phase for another five years of EPSCoR, with another set of States. Alabama, Idaho, Kentucky, Louisiana, Mississippi, Nevada, North Dakota, Oklahoma, Puerto Rico, South Dakota, Vermont, and Wyoming have been chosen to participate in the planning phase, based on their low success rate in obtaining Federal research funds. Up to eight of these States will be chosen for the 5-year program.

The Foundation's fiscal year 1986 budget includes $2.0 million for EPSCoR. This will fund in September, 1986 the first annual increment of research funding in awards made to the States chosen for the program. These awards will commit the Foundation to providing up to $3.0 million to each State over a maximum of 5 years.

The Committee continues to give strong support to the goals and objectives of this program. EPSCoR not only enables less-than-top funded institutions to compete for Federal research dollars, but enhances our total research base. States that participate must demonstrate commitment to making long-term improvements in their science and engineering infrastructure that will extend well beyond the NSF support period. This leads toward the overall objective of the program, that every geographic region of the United States should have access to a first-rate research institution.

18. WOMEN, MINORITIES, AND HANDICAPPED

Committee view

The Committee is pleased to note the $0.5 million increase in the Research Opportunities for Women (ROW) program. This program supports research grants for women who have not previously been principal investigators or who are reentering the research community. The $500,000 increase will fund the second year of initial awards made in fiscal year 1985, and permit the same number of new starts (8–10) in fiscal year 1986. This is a good beginning. NSF proposed that other programs for women and minorities remain at level funding for fiscal year 1986.

It is noted that funding responsibility for two of the programs, Minority Research Initiation (MRI) and Research Opportunities for Women (ROW), has been shifted to the discipline-oriented directories. As in other cases where targeted programs have been "mainstreamed," the Committee would urge careful tracking and monitoring of these two programs. The Committee is encouraged by recent improvements in NSF's Management Information System, and anticipates the system will soon generate more complete data on participation of women, minorities, and handicapped in all of NSF programs.

19. NSF ROLE IN INTERNATIONAL SCIENCE

Committee view

The purposes of the Foundation's activities in international science are twofold: to support and strengthen U.S. foreign policy objectives through cooperative science and engineering efforts; and to strengthen the research efforts of the United States by such means as cost-sharing for large facilities, access to specialized environments, instruments and facilities, or consultation with foreign experts.

The bulk of NSF international activities comes through the regular granting process: one out of every five Foundation grants includes some type of international involvement. An important and highly visible component of the Foundation's international efforts involves formal cooperative research. This includes bilateral and multilateral programs with some 30 countries in a broad variety of disciplines, as well as support to the National Academy of Sciences for cooperative activities with sister academies in China and Eastern Europe and U.S. participation in the International Council of Scientific Unions.

The Committee is pleased that the National Science Board (NSB) gave special attention to the role and responsibilities of NSF in international cooperation in science. The Committee strongly supports the recommendations of the May, 1984 report of the NSB Committee on International Science which follow:

> That the National Science Foundation and National Science Board make more extensive use of high level representatives outside of Government at International Science Policy meetings and negotiations in the U.S. and abroad.
>
> That the National Science Board establish a standing Committee on International Science.
>
> That the Director of the National Science Foundation appoint to his staff a Special Assistant for International Affairs, or take some comparable, alternative initiative to link the Foundation's international activities and interests with the activities and policies of other Government agencies and international bodies.
>
> That the Foundation take specific steps to develop a broader, more comprehensive information base on international science.
>
> That the Foundation assume a leadership role in planning and implementing major global initiatives, such as one relating to tropical forests or to the international aspects of scientific information systems, and also consider a leadership role in other such projects in the future.

The Committee also notes the initiative to establish a Director's Task Force on NSF International Strategy and Programs. The work of this task force, in conjunction with the NSF Advisory Committee for International Programs, could have a significant impact on the way NSF views and implements its mission in international science.

The Committee has been concerned over the years that NSF has assumed a less than adequate and visible leadership role in representing U.S. science interests in the international area. In particular, the Committee is concerned that formal bilateral and multilateral agreements are most often negotiated and concluded on the initiative of the Department of State that, in view of its mission, places a higher priority on foreign policy than on scientific objectives. The Committee believes NSF must assume a more agressive and stronger role in representing U.S. science in the negotiation of formal international agreements.

The Committee directs NSF to submit to the appropriate authorizing committees of the Congress no later than November, 1985, a report including:

(1) A summary of the recommendations of the various task forces and committees advising NSF on international science and engineering activities;

(2) A description of NSF's perceived role in supporting international cooperation in science and engineering;

(3) A strategic plan to implement the recommendations summarized in (1) above and to strengthen the international policymaking and analytical capabilities of the Foundation; and

(4) The approach NSF plans to pursue to enhance the Foundation's organizational capacity to assume a lead agency role in planning and participating in U.S. science and engineering international cooperation, to foster cooperation with other Federal agencies, and to use international science as a tool to maximize the overall effectiveness of U.S. international relations and policies.

Discussion

The Committee also wishes to emphasize the importance of continuing the examination of the Foundation's role in international science in light of the U.S. withdrawal from the International Institute for Applied Systems Analysis (IIASA) and UNESCO. In this regard the Committee is concerned about the proposed reduction of $1.5 million for the International Cooperative Scientific Activities Subactivity. In view of the U.S. withdrawal from UNESCO, the Committee strongly urges NSF to ensure that resources for U.S. participation in the International Council of Scientific Unions (ICSU) are at least equal to the resources available in fiscal year 1985. The Committee believes a reduction in the availability of funds for U.S. participation in ICSU is inconsistent with the March 20, 1985 Annual Report on Activities in the Fields of Science and Technology, Message from the President, PM-28 and the National Science Board's recommendations. With regard to IIASA, the Committee notes that this organization remains a significant force in the field of systems analysis research. The Committee encourages NSF to be receptive to proposals from international scientific organizations, such as IIASA, and consider such proposals on the basis of the scientific merit of each project.

The Committee is also concerned that NSF proposes to reduce by $0.3 million the resources available for U.S. participation in the Indo-U.S. Science and Technology initiative. The Foundation is encouraged to ensure adequate funds are available to fulfill previous commitments made for fiscal year 1986 regarding this initiative.

The Committee notes the Administration's renewal during 1984 of cooperative bilateral science and technology efforts with the Soviet Union in areas such as agriculture, health, and environmental protection and safety. The Committee urges the Foundation to support these efforts to recognize complementary strengths and seek mutual benefits through scientific cooperation with the Soviet Union.

20. NSF ROLE IN THE INTERNATIONAL GEOSPHERE/BIOSPHERE PROGRAM

Committee view

The International Geosphere/Biosphere Program (IGBP) is a proposed program of international research aimed at understanding the Earth as a living planet. More specifically, the program would seek to describe and understand: (1) the interactive physical, chemical, and biological processes that regulate the Earth's unique environment for life; (2) the changes that are occurring in the system, and (3) how they are influenced by human actions.

This idea surfaced as a U.S. initiative at Unispace '82, was advanced by activities at the National Research Council, and last fall was formally considered by the International Council of Scientific Unions (ICSU). ICSU subsequently adopted a resolution to investigate the possibility of such a formal international research program and formed an advisory group to make a recommendation for implementation at the next ICSU council meeting in 1986. A U.S. Committee on IGBP has been formed by the National Research Council to develop the U.S. proposal to ICSU.

The Committee believes that this program is very important, particularly because the Earth is undergoing several changes due to activities of man compounded by natural changes. Thus, the Earth could be experiencing a "greenhouse" effect due to increasing atmospheric carbon dioxide from burning fossil fuels while natural processes such as the El Nino ocean warming and the El Chichon volcano are also affecting the atmosphere. Separation and understanding of these effects is becoming feasible: advances in computer technology for handling data and in Earth-observing satellites now begin to make study of the Earth as a system practical.

The United States' participation in IGBP could involve many agencies including NSF, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, the Departments of Energy, Agriculture, Interior, and Defense, and the Environmental Protection Agency. A NASA Advisory Committee on Earth System Science recognized that any study of the Earth as a system would involve this large spectrum of agencies, and has been structured to include most of these organizations on the Committee. Therefore, the United States is moving toward developing an appropriately broad science program.

Many NSF activities will contribute to the IGBP research program. In many areas our understanding of the Earth as a system is limited by fundamental ignorance of the basic processes. For example, NSF research activities to enhance the understanding of the continental lithosphere—its structure, composition, and evaluation will make a significant contribution to the IGBP goals. NSF is also involved in the World Climate Research Program which traces its roots to the highly successful NSF-sponsored Global Atmospheric Research Progarm. Related programs supported by NSF include a study of the interannual variability of the tropical ocean and the global atmosphere, and the World Ocean Circulation Experiment.

The Committee encourages NSF to take full advantage of the challenge to contribute to the science base of the IGBP. The knowledge gained through NSF support often provides the foundation for mission-specific research. Thus, NSF has a unique opportuniy to facilitate collaborative and interdisciplinary research which will be an important component of the IGBP.

The Committee believes that IGBP is very important, and that as it proceeds basic research in Earth and Atmospheric Sciences will become an integral component. The Committee encourages NSF to continue its research activities to support IGBP and also to support the Earth Systems Science Committee and the National Research Council Committee on IGBP.

21. ARCTIC RESEARCH AND POLICY ACT

Committee view

In 1984, the Congress passed the Arctic Research and Policy Act of 1984 (Public Law 98-373), a culmination of several years' focus on concerns regarding a comprehensive national policy for scientific research in the Arctic. Although the United States presently spends more than $100 million annually on research in the Arctic region, these efforts are spread among more than a dozen Federal agencies, a state government, and the private sector, with little or no policy focus or coordination. In response to the many concerns, the Arctic Research Act directs the development and implementation of national Arctic policies and research plans and more extensive coordination of planning and budgeting by Federal agencies involved in Arctic research.

The Act calls for a 5-member, Presidentially appointed Arctic Research Commission and an Interagency Arctic Research Policy Committee composed of representatives of the Federal agencies that have an interest in Arctic research. The National Science Foundation will serve as lead agency for the Interagency Committee, as well as ex-officio member of the Arctic Research Commission.

An important part of the Interagency Committee's duties will be to survey Arctic research conducted by Federal, state, and local agencies, universities, and other public and private institutions to help determine priorities for future Arctic research. Since some 12 Federal agencies are involved with research in Arctic regions, and since NSF provides between 15 and 20 percent of the Federal research support, the Foundation's leadership role in this coordination effort is timely and extremely important. The interagency committee also will work with the Commission to develop and establish an integrated national Arctic research policy that will guide Federal agencies in developing and implementing their research programs in the Arctic, and prepare a comprehensive 5-year program plan to implement the policy.

The Committee is pleased to note that mechanisms have been put in place at NSF to support the Foundation's activities under the Arctic Research Policy Act. In January the President, by Executive Order, established the Arctic Research Commission and the Interagency Arctic Research Policy Committee. He has selected the members of the Commission, although as of this writing they are still in the clearance process. Once the Commission's membership has been announced, and the groups have had a chance to meet, it is expected that the Interagency Committee, under the leadership of NSF, will move ahead with its duties and responsibilities under the Act.

22. U.S. ANTARCTIC PROGRAM

Committee view

The U.S. Antarctic Program is conducted by the National Science Foundation as a national program. United States policy calls for the maintenance of an active and influential presence in Antarctica. Scientific research is the principal expression of the U.S. presence. Therefore, the availability of high quality construction and procurement support is imperative to ensure the goals of the scientific program can be accomplished in a cost-effective manner.

The ten-year contract which became effective on April 1, 1980 to provide for the design, procurement, and construction of support facilities for base level and direct science activities calls for a performance review of the delivery of products and services prior to continuation of the contract beyond the sixth year (1986) and eighth year (1988). The Committee understands this evaluation of the performance and quality of service provided by the contractor must be conducted in advance of the extension date in the event performance is unsatisfactory and a request-for-bid on a competitive basis is necessary to acquire a new support contractor.

The Committee notes that the last performance review was conducted in the summer of 1984, and that the next review should take place in the summer of 1986 to prepare for the 1988 extension target. The Committee urges NSF and the National Science Board (NSB) to conduct a careful and in-depth review of the performance and quality of products and services provided under the support contract. Since the last contract review, much of the NSF leadership and executive personnel responsible for the administration of the Antarctic program have changed, i.e., the Director of NSF, the Chairman of the NSB, the Assistant Director for Astronomical, Atmospheric, Earth, and Ocean Sciences, the Director of Polar Programs, and other top-level technical staff responsible for operations support. In view of the extensive change in leadership and the magnitude of the length and cost of such a support contract, the Committee believes it is incumbent upon the NSF and the NSB to ensure a thorough and expert review of the support contract in 1986.

23. CONTINENTAL LITHOSPHERE PROGRAM

Committee view

The Committee strongly supports the Foundation's earth sciences research initiative on the continental lithosphere, begun in fiscal year 1985. One of the major subelements of this program, the Continental Scientific Drilling activity, is an interagency effort involving NSF, the Department of Energy (DOE) and the U.S. Geological Survey (USGS).

The Committee urges these agencies to coordinate their respective research priorities and drilling programs in order to maximize the overall number of research opportunities available at each drilling site. In particular, the Committee directs the Foundation to make optimum use of the expertise available at DOE national laboratories and USGS facilities.

The Committee further directs the agencies to prepare a joint implementation plan for the Continental Scientific Drilling Program, to be submitted to the appropriate Congressional Committees prior to initiation of full-scale drilling activities.

Discussion

H.J. Res. 648, Sec. 323, enacted into law on October 12, 1984, expresses Congressional support for the Continental Scientific Drilling Program. The full text of the joint resolution follows:

> It is the sense of the Congress that the Continental Scientific Drilling Program is an important national scientific endeavor, benefiting the commerce of the Nation, which should be vigorously pursued by Government and the private sector. The Continental Scientific Drilling Program is an important national scientific endeavor that is vital to the understanding of the geologic evolution of the Earth and the economic value of its resources; the most effective and efficient means of realizing the fullest potential in the Continental Scientific Drilling Program is through a cooperative effort by the Department of Energy, the National Science Foundation, and the United States Geological Survey; many important commerical and scientific advances may result from the Continental Scientific Drilling Program; and many foreign nations are engaged in a comparable deep drilling program, and cooperation and coordination would be beneficial to United States efforts. It is the sense of the Congress that—
>
> (1) the Continental Scientific Drilling Program is an important national scientific endeavor by the United States which should be enthusiastically implemented through a joint cooperative effort among the United States Department of Energy, the National Science Foundation, and the United States Geological Survey;
>
> (2) the private sector should be encouraged to support the Continental Scientific Drilling Program and the participation in such program; and
>
> (3) the United States Government should cooperate to the extent practicable with the international com-

> munity in developing this important scientific and technical activity.

An Interagency Accord on Continental Scientific Drilling was signed by the three agencies on April 2, 1984. The Foundation replied to a Committee question concerning the NSF role and interagency cooperation as follows:

> The Interagency Accord on Continental Scientific Drilling, which was signed by the Department of Energy, the U.S. Geological Survey and the National Science Foundation on April 2, 1984, makes a distinction between funds for drilling operations and funds for scientific research. Drilling operations will be funded by the agency with the most interest in the goals addressed by a particular hole. As an example, the NSF will normally fund drilling for information on deep basement structures, while DOE will fund volcanic and geothermal projects, and USGS, earthquake fault studies. All agencies will share in funding the scientific research for each drilling project as appropriate to their missions.
>
> The NSF cooperates closely with DOE and the USGS through an Interagency Coordinating Group established specifically for the management of the Continental Scientific Drilling Program.

However, several National Academy of Sciences documents stress the need for close coordination. For example, the Committee concurs with the report, Continental Scientific Drilling Program, (NAS/NRC, 1979) in its section on implementation and organization (p. 16): "Not only is it in the public interest to maximize scientific return from the large public investment in drilling, but clearly *an integrated effort is more valuable then the simple sum of its parts"*. (emphasis added)

The Committee also concurs with the NAS report, Research Briefings 1983, which states (p. 7): "Drilling is costly and must be based on well-founded plans for research before, during and after drilling operations; thus the first requirement is for a *national planning and preparation effort for holes dedicated to science"*. (emphasis added)

Accordingly, the Committee views the Interagency Coordinating Group as the appropriate forum for developing a joint implementation plan for the Continental Scientific Drilling Program.

24. EXCHANGE OF SCIENTIFIC AND TECHNICAL INFORMATION

Committee view

Advances in information and communication technologies have rapidly increased the opportunities and feasibility of exchanging scientific and technical information and developing exchange machanisms and networks. Thus, the Committee again underscores the importance of the exchange of scientific and technical information for: (1) effective research planning and resource allocation; (2) the application of new knowledge; (3) the economic productivity of the private sector, as well as the Federal government; and (4) the enhancement of the quality of life. A viable scientific and technical information system is imperative to enhance technology transfer, aviod unnecessary duplication of research, and improve communications between scientists and research managers in government, academia, and the public and private sectors.

The Committee urges the Foundation to place increased emphasis on fulfilling one of the original functions of the Foundation specified in the National Science Foundation Act of 1950—"to foster the interchange of scientific information among scientists in the United States and foreign countries." In this regard, the Committee urged NSF last year to participate in National Technical Information Services (NTIS) programs.

The Committee is pleased that the Foundation began to participate in the NTIS program in fiscal year 1985 on a trial basis, by submitting status reports on research projects from the Engineering Directorate. The Committee strongly recommends that NSF take the necessary action to extend participation in the NTIS program to the other Directorates. In addition, the Committee recommends that NSF review its other activities in support of the mandate to foster exchange of scientific information, assess the effectiveness and adequacy of current NSF programs designed for this purpose, and make changes as appropriate.

25. SOCIETAL RESPONSE EARTHQUAKE RESEARCH PROGRAM

Committee view

The Committee notes that NSF plans to discontinue the Societal Response Earthquake program as an identifable program without a separate budget. The Committee would prefer that an identifiable program be maintained. However, the Committee appreciates the Foundation's rational that the overhead associated with a separate program cannot be justified. Thus, the Committee directs NSF to monitor the program to ensure that funds consistent with the importance of the program are obligated.

One important focus of the research program has been translation of scientific and engineering knowledge into public policy. Since fiscal year 1983, the Committee has heard testimony that advocated the need for better utilization of technical and scientific knowledge generated from the National Earthquake Hazards Reduction Program. Also, during authorization hearings, the Committee learned that one of the reasons that the societal response research effort was vital, is because knowledge gained through the research process often reaches other researchers, but is less generally available to such non-researchers as realtors, developers, lenders, planners, and municipal officials. This has been reflected by a limited utilization of such knowledge by state and local officials and by the private sector.

The need for a Societal Response Research element in the national eathquake program is further justified by the varied nature of the program itself. Since the program is a multidisciplinary, multi-agency and multi-governmental effort, it is easy for the various efforts to became separated, isolated and fragmented. By combining knowledge from the earth sciences, engineering, architecture, and the social sciences, a mix of public policies, scientific knowledge and professional training can be more effectively used to help a society reduce the hazard associated with an earthquake.

The Committee believes that a societal response research element provides the link between scientific and technological issues and rapidly developing major political, economic, social and organizational questions. For example, building codes, and other measures derived from engineering research are likely to have far greater effects in mitigating the impacts of earthquake as more is learned about the social, economic, political and legal factors that facilitate or hinder their acceptance or rejection by threatened communities.

Therefore, the need for research on policy analysis, program evaluation, organizational response, technology transfer, knowledge diffusion and other policy and implementation problems are too valuable to be lost as an identifiable part of a national effort to reduce the hazards associated with earthquakes, as well as other natural hazards. The Committee strongly urges NSF to continue support of this integral component of the National Earthquake Hazards Reduction Program.

26. CRITICAL AGRICULTURAL MATERIALS

Committee view

On May 16, 1984, President Reagan signed into law H.R. 2733, reauthorizing (for another five years) and renaming the Native Latex Commercialization and Economic Development Act of 1978 (Public Law 95-592) as the Critical Agricultural Materials Act (Public Law 98-284).

Public Law 98-284 expanded the scope of the Act to include research into other agricultural crops that could bear materials of strategic and industrial importance within the U.S. For the purposes of coordinating all these activities, the bill established the Office of Critical Agricultural Materials in the Department of Agriculture and renamed the Joint Commission on Guayale Research as the Joint Commission on Research and Development of Critical Agricultural Materials.

While the Department of Agriculture was designated as lead agency and permanent chair of the Joint Commission, the Committee believes NSF through the Biological, Behavioral and Social Science Directorate, has truly a unique capacity to promote the study of plant morphology, physiology and biochemistry leading to a better understanding of the potential for economic plant species. Therefore, the Committee directs NSF to use its expertise in this and other areas to meet the intent of Public Law 98-284 and coordinate its activities with the Department of Agriculture and members of the Joint Commission on Research and Development of Critical Agricultural Materials.

III. EXPLANATION OF COMMITTEE AMENDMENTS

The amendment in the nature of a substitute adopted by the Committee is presented at the beginning of this report.

EXPLANATION

The Committee adopted an amendment in the nature of a substitute which:

(1) Authorizes a total of $1,600,850,000 for operations of the National Science Foundation for fiscal year 1986. This authorization is the same amount as the Administration's request for fiscal year 1985. The funds are to be distributed as follows:

(a) Advanced Scientific Computing.—The Committee approved the Administration's request of $46,230,000.

(b) Astronomical, Atmospheric, Earth, and Ocean Sciences.—The Committee approved the Administration's request of $372,170,000.

(c) Biological, Behavioral, and Social Sciences.—The Committee approved the Administration's request of $272,050,000.

(d) Engineering.—The Committee approved the Administration's request of $170,070,000.

(e) Mathematical and Physical Sciences.—The Committee approved the Administration's request of $428,970,000.

(f) Scientific, Technological, and International Affairs.—The Committee approved the Administration's request of $38,360,000.

(g) Program Development and Management.—The Committee approved the Administration's request of $69,900,000.

(h) Science and Engineering Education.—The Committee approved a total authorization of $82,000,000. The Administration's request was for $50,550,000 in new obligational authority, in addition to $31,500,000 carried over from fiscal year 1985. Further discussion of this action is contained in the Committee Views.

(i) United States Antarctic Program.—The Committee approved the Administration's request of $120,100,000.

(j) Special Foreign Currency.—The Committee approved the Administration's request of $1,000,000.

(2) Requires that:

(a) Of the funds authorized, not less than $1,000,000 shall be available for research in ethics and values in science and technology, Further discussion is contained in the Committee Views.

(b) Of the funds authorized, not less than $3,000,000 shall be available for the Policy Research and Analysis program. Further discussion is contained in the Committee Views.

(c) In the obligation, use, and expenditure of funds appropriated for Biotic Systems and Resources in the Biological, Behavioral, and Social Sciences directorate, and for Atmospheric Sciences in the Astronomical, Atmospheric, Earth, and Ocean Sciences directorate, emphasis shall be placed on basic research to understand the phenomena of acid rain.

(d) No funds shall be expended toward closing a National facility without appropriate scientific review, including the appropriate NSF advisory committee or committees and the National Science Board.

(3) Provides that funds may be transferred among categories, but where proposed transfers exceed 10 percent of the amount author-

ized for the categories involved, the Speaker of the House, the President of the Senate and the appropriate authorizing committees of the House and Senate must be notified and 30 days elapse before such transfers are made.

(4) Authorizes the National Science Foundation to establish and maintain a capability in the Foundation, for the purpose of identifying and assessing the research facilities needs of universities. Such data shall be collected and analyzed by major field of science and engineering, and shall include data on university expenditures for construction and modernization of facilities and source of funds. The Foundation shall conduct the necessary surveys and report results to Congress every two years, the first report due September 1, 1986. Further discussion is contained in the Committee Views.

(5) Amends section 6 of the National Science Foundation Act of 1950 to remove the requirement that Assistant Directors be appointed by the President. Further discussion is contained in the Committee Views.

(6) Amends section 4(e) of the National Science Foundation Act of 1950 to remove obsolete language requiring that National Science Board members be notified of meetings by registered or certified mail.

(7) Amends section 5(e) of the National Science Foundation Act to permit the Director to make contracts, grants and other arrangements, under delegation of authority from the National Science Board. Such delegation of authority may not exceed two years, and the Board must submit to Congress every two years a report explaining actions taken under this subsection. In effect, this amendment removes the dollar limit on contracts that may be approved by the Director without approval by the Board in each case. Further discussion is contained in the Committee Views.

(8) Amends section 12 of the National Science Foundation Act by deleting subsection (b), which bans National Science Foundation employees from owning United States patents on inventions resulting from their work at the Foundation. The requirement serves no useful purpose since the Foundation performs no in-house research.

(9) Amends section 9 of the National Science Foundation Act to allow the National Science Board more flexibility in establishing special commissions authorized under the Act.

> (a) The amendment authorizes the Board discretion in fixing the size and composition of a special commission, rather than limiting it to six scientists and five non-scientists.
>
> (b) The amendment authorizes the Board to establish commissions to study and make recommendations on issues relating to research and education in science and engineering, rather than restricting them to a particular scientific field of study.

(10) Deletes subsection 14(b) of the National Science Foundation Act of 1950 to remove an unnecessary limitation on the activities of senior Foundation officials. The language of subsection 14(b) forbids the Director, Deputy Director, and Assistant Directors from engaging "in any other business, vocation, or employment while serving in such position," thereby precluding such positions from being held by part-time officers. The Foundation clearly is of a size that could not now feasibly be run by part-time officials, and the provi-

sion is unnecessary. Also, the language casts some doubt on the right of the National Science Foundation Director, Deputy Director, or an Assistant Director to have outside interests such as would be permitted to other full-time government executives.

(11) Amends section 14 of the National Science Foundation Act to prohibit disclosure of any information supplied to the Foundation by an industrial or commercial organization in surveys or questionnaires unless such information has been transformed into statistical or aggregate form that does not allow identification of the supplier. Names of organizations that supply such information may not be disclosed to the public.

(12) Deletes section 10 of Public Law 95-99, to remove codification of a requirement that National Science Foundation employees disclose any financial interest or academic affiliations that might bear on their handling of proposals or applications. The requirement has been superseded by the Ethics in Government Act, and is therefore unnecessary.

(13) Amends section 6(a) of Public Law 94-86 to eliminate the statutory limits on the term and amount of the Alan T. Waterman Award. The belief is that the value of the Award has been eroded by inflation; the National Science Board will periodically establish amounts and terms of grants under this section.

(14) Deletes section 6 of Public Law 95-99, to remove unnecessary codification of this section of the National Science Foundation Authorization Act of 1978. The section directed the Foundation to establish a Resource Center for Science and Engineering; four have been established. No other specific programs of the Foundation have been permanently codified. Also, authority for establishing such centers is now covered under the Science and Technology Equal Opportunities Act.

(15) Amends section 9 of Public Law 96-44 to provide that the National Science Board, as well as the National Science Foundation, shall keep the House and Senate authorizing committees fully informed with respect to activities of the Foundation. The Board was not included in this section prior to this amendment.

(16) Amends the National Science Foundation Act of 1950 in several places, to include fundamental engineering research and engineering education in the Foundation's mission.

(a) Section 3(a)(1) of the Act is amended to state that the Foundation is authorized and directed—

(1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, social, and other sciences, and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific, engineering, and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

(b) Sections 3(a)(3), 3(a)(4), 3(a)(5), 3(a)(6), 3(a)(7); 3(b); 3(c); 3(d); 3(e); 4(c); sections 10, 11, 12; 13(a), 13(b); 14; 15(b); section 2(b) of Public Law 94-86; as well as Part B of Public Law 96-516 are all amended by addition of words to confirm them to the intent expressed in section 3(a)(1). Further discussion is contained in the Committee Views.

(17) Requires that within 90 days of enactment of this Act, the Director of NSF shall review the Grace Commission's recommendations and report to the Speaker of the House and appropriate committees of the House and Senate on the implementation of those recommendations which affect NSF.

IV. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of Rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL SCIENCE FOUNDATION ACT OF 1950

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FUNCTIONS OF THE FOUNDATION

SEC. 3. (a) The Foundation is authorized and directed—

(1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, **[**engineering,**]** social and other sciences, *and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering,* by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific, *engineering,* and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

(2) to award, as provided in section 10, scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering, social, and other sciences;

(3) to foster the interchange of scientific *and engineering* information among scientists *and engineers* in the United States and foreign countries;

(4) to foster and support the development and use of computer and other scientific *and engineering* methods and technologies, primarily for research and education in the sciences *and engineering;*

(5) to evaluate the status and needs of the various sciences *and fields of engineering* as evidenced by programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups, employing by grant or contract such consulting services as it may deem necessary for the purpose of such evalua-

tions; and to take into consideration the results of such evaluations in correlating the research and educational programs undertaken or supported by the Foundation with programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups;

(6) to maintain a current register of scientific and [technical] *engineering* personnel, and in other ways to provide a central clearinghouse for the collection, interpretation, and analysis of data on the availability of, and the current and projected need for scientific and [technical] *engineering* resources in the United States, and to provide a source of information for policy formulation by other agencies of the Federal Government; and

(7) to initiate and maintain a program for the determination of the total amount of money for scientific *and engineering* research, including money allocated for the construction of the facilities wherein such research is conducted, received by each educational institution and appropriate nonprofit organization in the United States, by grant, contract, or other arrangement from agencies of the Federal Government, and to report annually thereon to the President and the Congress.

(b) The Foundation is authorized to initiate and support specific scientific *and engineering* activities in connection with matters relating to international cooperation, national security, and the effects of scientific *and engineering* applications upon society by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such activities. When initiated or supported pursuant to requests made by any other Federal department or agency, including the Office of Technology Assessment, such activities shall be financed whenever feasible from funds transferred to the Foundation by the requesting official as provided in section [14(g)] *14(f),* and any such activities shall be unclassified and shall be identified by the Foundation as being undertaken at the request of the appropriate official.

(c) In addition to the authority contained in subsections (a) and (b), the Foundation is authorized to initiate and support scientific *and engineering* research, including applied research, at academic and other nonprofit institutions. When so directed by the President, the Foundation is further authorized to support, through other appropriate organizations, applied scientific research *and engineering research* relevant to national problems involving the public interest. In exercising the authority contained in this subsection, the Foundation may employ by grant or contract such consulting services as it deems necessary, and shall coordinate and correlate its activities with respect to any such problem with other agencies of the Federal Government undertaking similar programs in that field.

(d) The Board and the Director shall recommend and encourage the pursuit of national policies for the promotion of [basic] research and education in *science and engineering.* [the sciences.]

(e) In exercising the authority and discharging the functions referred to in the foregoing subsections, it shall be one of the objectives of the Foundation to strengthen research and education in the sciences *and engineering,* including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.

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NATIONAL SCIENCE BOARD

SEC. 4. (a) * * *

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(c) The persons nominated for appointment as members of the Board (1) shall be eminent in the fields of the basic, medical, or social sciences, engineering, agriculture, education, research management or public affairs; (2) shall be selected solely on the basis of established records of distinguished service, and (3) shall be so selected as to provide representation of the views of scientific *and engineering* leaders in all areas of the Nation. In making nominations under this section, the President shall give due regard to equitable representation of scientists *and engineers* who are women or who represent minority groups. The President is requested, in the making of nominations of persons for appointment as members, to give due consideration to any recommendations for nomination which may be submitted to him by the National Academy of Science, *the National Academy of Engineering,* the National Association of State Universities and Land Grant Colleges, the Association of American Universities, the Association of American Colleges, the Association of State Colleges and Universities, or by other scientific, *engineering,* or educational organizations.

* * * * * * *

(e) The Board shall meet annually on the third Monday in May unless, prior to May 10 in any year, the Chairman has set the annual meeting for a day in May other than the third Monday and at such other times as the Chairman may determine, but he shall also call a meeting whenever one-third of the members so request in writing. A majority of the members of the Board shall constitute a quorum. Each member shall be given notice **[**by registered mail or certified mail mailed to his last known address of record**]** not less than fifteen days prior to any meeting, of the call of such meeting.

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DIRECTOR OF THE FOUNDATION

SEC. 5. (a) * * *

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[(e) The Director shall not make any contract, grant, or other arrangement pursuant to section 11(c) without the prior approval of the Board, except that a grant, contract, or other arrangement involving a total commitment of less than $2,000,000 or less than $500,000 in any one year, or a commitment of such lesser amount of amounts and subject to such other conditions as the Board in its discretion may from time to time determine to be appropriate and publish in the Federal Register, may be made if such action is taken pursuant to the terms and conditions set forth by the Board, and if each such action is reported to the Board at the Board meeting next following such action.]

(e) The Director may make contracts, grants, and other arrangements pursuant to section 11(c) only with the prior approval of the Board or under authority delegated by the Board, and subject to such conditions as the Board may impose. Any delegation of authority or imposition of conditions under the preceding sentence shall be effective only for a such period of time, not exceeding two years, as the Board may specify, and shall be promptly published in the Federal Register and reported to the appropriate authorizing committees of the Congress. On October 1 of each odd-numbered year the Board shall submit to the Congress a concise report which explains and justifies any actions taken by the Board under this subsection to delegate its authority or impose conditions within the preceding two years.

* * * * * * *

DEPUTY DIRECTOR AND ASSISTANT DIRECTORS

SEC. 6. [(a)] There shall be a Deputy Director of the Foundation (referred to in this Act as the "Deputy Director) who shall be appointed by the President, by and with the advice and consent of the Senate. Before any person is appointed as Deputy Director, the President shall afford the Board and the Director an opportunity to make recommendations to him with respect to such appointment. The Deputy Director shall receive basic pay at the rate provided for level III of the Executive Schedule under section 5314 of title 5 United States Code, and shall perform such duties and exercise such powers as the Director may prescribe. The Deputy Director shall act for, and exercise the powers of the Director during the absence or disability of the Director or in the event of a vacancy in the office of Director.

[(b) There shall be four Assistant Directors of the Foundation (each referred to in this Act as an "Assistant Director") who shall be appointed by the President, by and with the advice and consent of the Senate. Before any person is appointed as an Assistant Director, the President shall afford the Board and the Director an opportunity to make recommendations to him with respect to such appointment. Each Assistant Director shall receive basic pay at the rate provided for level V of the Executive Schedule under section 5316 of title 5, United States Code, and shall perform such duties and exercise such powers as the Director may prescribe.]

* * * * * * *

SPECIAL COMMISSIONS

SEC. 9. [(a)] Each special commission established pursuant to section 4(i) shall consist of eleven members appointed by the Board, six of whom shall be eminent scientists and five of whom shall be persons other than scientists. Each special commission shall choose its own chairman and vice chairman.

[(b) It shall be the duty of each such special commission to make a comprehensive survey of research, both public and private, being carried on in its field, and to formulate and recommend to the Foundation at the earliest practicable date an over-all research program in its field.]

(a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.

(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering.

SCHOLARSHIPS AND GRADUATE FELLOWSHIPS

SEC. 10. The Foundation is authorized to award, within the limits of funds made available specifically for such purpose pursuant to section 16, scholarships and graduate fellowships for [scientific study or scientific work in the mathematical, physical, medical, biological, engineering, social, and other sciences] *study and research in the sciences or in engineering* at appropriate nonprofit American or nonprofit foreign institutions selected by the recipient of such aid, for stated periods of time. Persons shall be selected for such scholarships and fellowships from among citizens or nationals of the United States, and such selections shall be made solely on the basis of ability; but in any case in which two or more applicants for scholarships or fellowships, as the case may be, are deemed by the Foundation to be possessed of substantially equal ability, and there are not sufficient scholarships or fellowships, as the case may be, available to grant one to each of such applicants, the available scholarship or scholarships or fellowship or fellowships shall be awarded to the applicants in such manner as will tend to result in a wide distribution of scholarships and fellowships throughout the United States. Nothing contained in this Act shall prohibit the Foundation from refusing or revoking a scholarship or fellowship award, in whole or in part, in the case of any applicant or recipient, if the Board is of the opinion that such award is not in the best interests of the United States.

GENERAL AUTHORITY OF FOUNDATION

SEC. 11. The Foundation shall have the authority, within the limits of available appropriations, to do all things necessary to carry out the provisions of this Act, including, but without being limited thereto, the authority—

(a) * * *

* * * * * * *

(c) to enter into contracts or other arrangements, or modifications thereof, for the carrying on, by organizations or individuals in the United States and foreign countries, including other government agencies of the United States and of foreign countries, of such scientific *or engineering* activities as the Foundation deems necessary to carry out the purposes of this Act, and, at the request of the Secretary of State or Secretary of Defense, specific scientific *or engineering* activities in connection with matters relating to international cooperation or national security, and when deemed appropriate by the Foundation, such contracts or other arrangements or modifications thereof, may be entered into without legal consideration, without performance or other bonds and without regard to section 3709 of the Revised Statutes (41 U.S.C. § 5);

(d) to make advance, progress, and other payments which related to scientific *or engineering* activities without regard to the provisions of section 3648 of the Revised Statutes (31 U.S.C. § 529);

* * * * * * *

(g) to publish or arrange for the publication of scientific and [technical] *engineering* information so as to further the full dissemination of information of scientific *or engineering* value consistent with the national interest, without regard to the provisions of section 87 by the Act of January 12, 1895 (28 Stat. 622), and section 11 of the Act of March 1, 1919 (40 Stat. 1270; 44 U.S.C. § 103 and first sentence of § 501);

* * * * * * *

PATENT RIGHTS

SEC. 12. [(a)] Each contract or other arrangement executed pursuant to this Act which relates to scientific *or engineering* research shall contain provisions governing the disposition of inventions produced thereunder in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed: *Provided, however,* That nothing in this Act shall be construed to authorize the Foundation to enter into any contractual or other arrangement inconsistent with any provision of law affecting the issuance or use of patents.

[(b) No officer or employee of the Foundation shall acquire, retain, or transfer any rights, under the patent laws of the United States or otherwise, in any invention which he may make or produce in connection with performing his assigned activities and which is directly related to the subject matter thereof: *Provided, however,* That this subsection shall not be construed to prevent any officer or employee of the Foundation from executing any application for patent on any such invention for the purpose of assigning the same to the Government or its nominee in accordance with such rules and regulations as the Director may establish.]

INTERNATIONAL COOPERATION AND COORDINATION WITH FOREIGN POLICY

SEC. 13. (a) The Foundation is hereby authorized to cooperate in any international scientific *or engineering* activities consistent with the purposes of this Act and to expend for such international scientific *or engineering* activities such sums within the limit of appropriated funds as the Foundation may deem desirable. The Director may defray the expenses of representatives of Government agencies and other organizations and of individual scientists *or engineers* to accredited international scientific *or engineering* congresses and meetings whenever he deems it necessary in the promotion of the objectives of this Act. In this connection, with the approval of the Secretary of State, the Foundation may undertake programs, granting fellowships to, or making other similar arrangements with, foreign nationals for [scientific study or scientific work] *study and research in the sciences or in engineering* in the United States without regard to section 10 or the affidavit of allegiance to the United States required by section 15(d)(2) of this Act.

(b)(1) The authority to enter into contracts or other arrangements with organizations or individuals in foreign countries and with agencies of foreign countries, as provided in section 11(c), and the authority to cooperate in international scientific *or engineering* activities as provided in subsection (a) of this section, shall be exercised only with the approval of the Secretary of State, to the end that such authority shall be exercised in such manner as is consistent with the foreign policy objectives of the United States.

(2) If, in the exercise of the authority referred to in paragraph (1) of this subsection, negotiation with foreign countries or agencies thereof becomes necessary, such negotiation shall be carried on by the Secretary of State in consultation with the Director.

MISCELLANEOUS PROVISIONS

SEC. 14. (a) * * *

* * * * * * *

[(b) Neither the Director, the Deputy Director, nor any Assistant Director shall engage in any other business, vocation, or employment while serving in such position; nor shall the Director, the Deputy Director, or any Assistant Director, except with the approval of the Board, hold any office in, or act in any capacity for, any organization, agency, or institution with which the Foundation makes any grant, contract, or other arrangement under this Act.]

[(c)] *(b)* The Foundation shall not, itself, operate any laboratories or pilot plants.

[(d)] *(c)* The members of the Board and the members of each special commission shall receive compensation at the rate of $100 for each day engaged in the business of the Foundation pursuant to authorization of the Foundation and shall be allowed travel expenses as authorized by section 5703 of title 5, United States Code.

[(e)] *(d)* Persons holding other offices in the executive branch of the Federal Government may serve as members of the special commissions, but they shall not receive remuneration for their services as such members during any period for which they receive compensation for their services in such other offices.

[(f)] *(e)* In making contracts or other arrangements for scientific *or engineering* research, the Foundation shall utilize appropriations available therefor in such manner as will in its discretion best realize the objectives of (1) having the work performed by organizations, agencies, and institutions, or individuals in the United States or foreign countries, including Government agencies of the United States and of foreign countries, qualified by training and experience to achieve the results desired, (2) strengthening the research staff of organizations, particularly nonprofit organizations, in the United States, (3) aiding institutions, agencies or organizations which, if aided, will advance scientific *or engineering* research, and

(4) encouraging independent scientific *or engineering* research by individuals.

[(g)] *(f)* Funds available to any department or agency of the Government for scientific or [technical] *engineering* research, or the provision of facilities therefor, shall be available for transfer, with the approval of the head of the department or agency involved, in whole or in part, to the Foundation for such use as is consistent with the purposes for which such funds were provided, and funds so transferred shall be expendable by the Foundation for the purposes for which the transfer was made.

[(h)] *(g)* For purposes of this Act, the term "United States" when used in a geographical sense means the States, the District of Columbia, the Commonwealth of Puerto Rico, and all territories and possessions of the United States.

[(i)] *(h)* Notwithstanding any other provision of law, the authorization of any appropriation to the Foundation shall expire (unless an earlier expiration is specifically provided) at the close of the second fiscal year following the fiscal year for which the authorization was enacted, to the extent that such apropriation has not theretofore actually been made.

(i) Information supplied to the Foundation or a contractor of the Foundation by an industrial or commercial organization in survey forms, questionnaires, or similar instruments for the purpose of subsection (a)(5) or (a)(6) of section 3 may not be disclosed to the public unless such information has been transformed into statistical or aggregate formats that do not allow the identification of the supplier. The names of organizations supplying such information may not be disclosed to the public.

SECURITY PROVISIONS

SEC. 15. (a) * * *

* * * * * * *

(b)(1) In the case of scientific or [technical] *engineering* research activities under this Act in connection with matters relating to the national defense, with respect to which funds have been transferred to the Foundation from the Department of Defense in accordance with the provisions of section [14(g)] *14(f)* of this Act, the Secretary of Defense shall establish such security requirements and safeguards, including restrictions with respect to access to information and property, as he deems necessary.

(2) In the case of scientific *or engineering* research activities under this Act in connection with matters relating to the national defense other than research activities referred to in paragraph (1) of this subsection, the Foundation shall establish such security requirements and safeguards, including restrictions with respect to access to information and property as it deems necessary.

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SECTION 5316 of Title 5, UNITED STATES CODE

§ 5316. Positions at level V

Level V of the Executive Schedule applies to the following positions, for which the annual rate of basic pay shall be the rate determined with respect to such level under chapter 11 of title 2, as adjusted by section 5318 of this title:

Administrator, Agricultural Marketing Service, Department of Agriculture.

* * * * * * *

[Assistant Directors, National Science Foundation (4).]

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NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, FISCAL YEAR 1978

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[SEC. 6. (a) The National Science Foundation shall establish a Resource Center for Science and Engineering to be located at an educational institution which—

[(1) enrolls substantial numbers of minority students, students from low-income families, or both;

[(2) is geographically located near one or more population centers of low-income families or minority groups;

[(3) demonstrates a commitment to encouraging and assisting minority students or student from low-income families, or both; and

[(4) has an existing or developing capacity to offer doctoral programs in science and engineering.

[(b) The Center established under this section shall—

[(1) support basic research and the acquisition of necessary research facilities and equipment;

[(2) serve as a regional resource in science and engineering for the community which the Center serves; and

[(3) develop joint educational programs with nearby pre-college and undergraduate institutions which enroll a substantial number of minority students or students from low-income families.]

SEC. [7.] *6.* In addition to such sums as are authorized by section 2, not to exceed $4,900,000 is authorized to be appropriated for the fiscal year 1978 for expenses of the National Science Foundation incurred outside the United States to be paid for in foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States.

SEC. [8.] *7.* Appropriations made pursuant to this Act may be used, but not to exceed $5,000, for official consultation, representation, or other extraordinary expenses upon the approval or authority of the Director of the National Science Foundation, and his determination shall be final and conclusive upon the accounting officers of the Government.

SEC. [9.] *8.* The National Science Foundation is directed to issue instruction to grantees for pre-college curriculum projects covering the protection of pre-college students and procedures for involving such students in pre-college education research an development, pilot-testing, evaluation, and revision of experimentation and innovative pre-college curriculum projects funded by the Foundation. These instructions shall require such grantees to obtain written approval of the school board or comparable authority responsible for the schools prior to the involvement of such students.

[SEC. 10. (a)(1) Each officer or employee of the National Science Foundation who performs a decisionmaking function in the handling of any application or proposal for a grant from or contract with the Foundation shall provide a written statement for the record identifying (in accordance with the standards promulgated under subsection (b)) any financial interest or other relevant interest he or she has in the person submitting the application or proposal and any academic affiliation he or she has with that person. If the application or proposal results in an award, the statement shall be made available to the public.

[(2) The Director shall remove or take other appropriate disciplinary action against any employee who knowingly violates the requirements of this subsection.

[(b)(1) Within 60 days after the date of the enactment of this Act, the Director of the National Science Foundation shall publish—

[(A) proposed standards to implement the requirements of subsection (a), designed to minimize conflicts of interest and to assure that the appropriate files of the Foundation relating to any grant or contract referred to in such subsection contain a statement of any financial or other relevant interest which any of the officers and employees involved may have in the person or institution applying for or proposing the grant or contract as well as any academic affiliation which any of such officers and employees may have with such person or institution; and

[(B) proposed standards appropriately requiring identification of any conflicts of interest by peer reviewers.

[(2) Within 120 days after the date of the enactment of this Act, the Director shall promulgate the standards published under paragraph (1), with such standards shall take effect upon their promulgation.

[(c) The Director shall report annually to the Congress on the administration and enforcement of this section.

[(d) If the President issues an Executive order that requires financial disclosure by officers and employees of Federal agencies generally, only so much of this section as relates to peer reviewers and to academic affiliations of officers and employees shall remain effective.]

SEC. [11.] *9.* Appropriations made pursuant to this Act shall remain available for obligation, for expenditure, or for obligation and expenditure, for such period or periods as may be specified in the Acts making such appropriations.

SEC. [12.] *10.* No funds may be transferred from any particular category listed in section 2 to any other category or categories listed in such section if the total of the funds so transferred from that particular category would exceed 10 per centum thereof, and no funds may be transferred to any particular category listed in section 2 from any other category, or categories listed in such section if the total of the funds so transferred to that particular category would exceed 10 per centum thereof, unless—

(1) a period of thirty legislative days has passed after the Director of the National Science Foundation or his designee has transmitted to the Speaker of the House of Representatives and to the President of the Senate and to the Committee on Science and Technology of the House of Representatives and to the Committee on Human Resources of the Senate a written report containing a full and complete statement concerning the nature of the transfer and the reason therefor, or

(2) each such committee before the expiration of such period has transmitted to the Director written notice to the effect that such committee has no objection to the proposed action.

SEC. [13.] *11.* Notwithstanding any other provision of this or any other Act, the Director of the National Science Foundation shall keep the Committee on Science and Technology of the House of Representatives and the Committee on Human Resources of the Senate fully and currently informed with respect to all of the activities of the National Science Foundation.

SEC. [14.] *12.* (a) Section 3(e) of the National Science Foundation Act of 1950 (42 U.S.C. 1862(e)) is amended by striking out "one of the objectives" and inserting in lieu thereof "an objective".

(b) Section 4 of such Act (42 U.S.C. 1863) is amended by adding at the end thereof the following new subsection:

"(j) The Board shall render an annual report to the President, for submission to the Congress on or before March 31 in each year. Such report shall deal essentially, though not necessarily exclusively, with policy issues or matters which affect the Foundation or with which the Board in its official role as the policymaking body of the Foundation is concerned.".

(c) Section 14(d) of such Act (42 U.S.C. 1873(d)) is amended to read as follows:

"(d) The menbers of the Board and the members of each special commission shall receive compensation for each day engaged in the business of the Foundation at a rate fixed by the Chairman but not exceeding the rate specified for the daily rate for GS-18 of the General Schedule under section 5332 of title 5, United States Code, and shall be allowed travel expenses as authorized by section 5703 of title 5, United States Code.".

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1976

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SEC. 2. (a) * * *

(b) After the date of enactment of this Act the Director of the National Science Foundation, shall require, as a condition of any award made by the National Science Foundation for the purpose of precollege science *or engineering* curriculum development activities, that the awardee, and any subcontractors involved in the distribution, marketing, or selling of such science *or engineering* curricula, shall include in any testing agreement, sales contract, or other comparable legal instrument a provision requiring that all instructional materials, including teacher's manuals, films, tapes, or other supplementary instructional materials developed or provided under such award, subcontract, or other legal instrument, will be made available within the school district using such materials for inspection by parents or guardians of children engaged in educational programs or projects of that school district. In addition, the Director of the National Science Foundation shall take such action as may be necessary and feasible to modify awards made for the purpose of precollege science *or engineering* curriculum development and implementation activities on or before the date of enactment of this Act to include such a provision in all possible cases.

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SEC. 6. (a) The National Science Foundation is authorized to establish the Alan T. Waterman Award for research or advanced study in the mathematical, physical, medical, biological, engineering, social, or other sciences. The award authorized by this section shall consist of a suitable medal and a grant [not to exceed $50,000 per year for a period not to exceed three years] to support further research or study by the recipient. *The National Science Board will periodically establish the amounts and terms of such grants under this section.*

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NATIONAL SCIENCE FOUNDATION AUTHORIZATION AND SCIENCE AND TECHNOLOGY EQUAL OPPORTUNITIES ACT

PART B—WOMEN, MINORITIES, SCIENCE, AND [TECHNOLOGY] *ENGINEERING*

SHORT TITLE

SEC. 31. This part may be cited as the "Science and [Technology] *Engineering* Equal Opportunities Act".

FINDINGS AND POLICY

SEC. 32. (a) The Congress finds that it is in the national interest to promote the full use of human resources in science and [technology] *engineering* and to insure the full development and use of the scientific [talent and technical skills] of men and women, equally, of all ethnic, racial, and economic backgrounds.

(b) The Congress declares it is the policy of the United States to encourage men and women, equally, of all ethnic, racial, and economic backgrounds to acquire skills in science, *engineering,* and mathematics to have equal opportunity in education, training, and employment in scientific and [technical] *engineering* fields, and thereby to promote scientific *and engineering* literacy and the full use of the human resources of the Nation in science and [technology] *engineering.* To this end, the Congress declares that the highest quality science *and engineering* over the long-term requires substantial support, from currently available research and educational funds, for increased participation in science and [technology] *engineering* by women and minorities. The Congress further declares that the impact on women and minorities which is produced by advances in science and [technology] must be included as essential factors in national and international science, technology, and economic policies.

WOMEN IN SCIENCE

SEC. 33. The Foundation is authorized to—

(1) support activities designed to—

(A) increase the participation of women in courses of study at the undergraduate, graduate, and postgraduate levels leading to degrees in scientific and [technical] *engineering* fields;

(B) encourage women to consider and prepare for careers in science and [technology] *engineering*; or

(C) provide traineeship and fellowship opportunities for women in science and [technology] *engineering*;

(2) support programs in science, *engineering*, and mathematics in elementary and secondary schools so as to stimulate the acquisition of knowledge, skills, and information by female students and to increase female student awareness of career opportunities requiring scientific and [technical] *engineering* skills;

(3) support activities in continuing education in science and engineering which provide opportunities for women who—

(A) are in the work force, or

(B) who are not in the work force because their careers have been interrupted,

to acquire new knowledge, techniques, and skills in scientific and [technical] *engineering* fields;

(4) undertake a comprehensive research program designed to increase public understanding of (A) the potential contribution of women in science and [technology] *engineering* and (B) the means to facilitate the participation and advancement of women in scientific and [technical] *engineering* careers;

(5) establish a visiting women scientists *and engineers* program;

(6) support activities designed to improve the availability and quality of public information concerning the importance of the participation of women in careers in science and [technology] *engineering*;

(7) support activities of museums and science centers which demonstrate potential to interest and involve women in science and [technology] *engineering*;

(8) make grants, to be known as the National Research Opportunity Grants, to women scientists *and engineers* who (A) have received their doctorates within five years prior to the date of the award or (B) have received their doctorates, have had their careers interrupted, and are re-entering the work force within five years after such interruption;

(9) make grants to women eligible under paragraph (8) to assist such women in planning and developing a research project eligible for support under such paragraph;

(10) provide support to individuals or academic institutions for full-time or part-time visiting professorships for women in science *and engineering*; and

(11) support demonstration project activities of individuals, public agencies, and private entities designed to encourage the employment and advancement of women in science[, engineering, and technology] *and engineering.*

MINORITIES IN SCIENCE

SEC. 34. (a) The Foundation is authorized (1) to udertake or support a comprehensive science *and engineering* education program to increase the participation of minorities in science and [technology,] *engineering,* and (2) to support activities to initiate research at minority institutions.

(b) By September 30, 1981, the Director, with the advice and assistance of the Committee on Equal Opportunities in Science and Technology established in section 36, shall prepare and transmit to the Committee on Science and Technology of the House of Representatives a report proposing a comprehensive and continuing program at the Foundation to promote the full participation of minorities in science and technology. Such report shall contain budgetary and legislative recommendations for the carrying out of such program by the Foundation.

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COMMITTEE ON EQUAL OPPORTUNITIES IN SCIENCE AND [TECHNOLOGY] *ENGINEERING*

SEC. 36. (a) There is established within the Foundation a Committee on Equal Opportunities in Science and [Technology] *Engineering* (hereinafter referred to as the "Committee"). The Committee shall provide advice to the Foundation concerning (1) the implementation of the provisions of this Act and (2) other policies and activities of the Foundation to encourage full participation of women, minorities, and other groups currently underrepresented in scientific [engineering, professional, and technical], *engineering, and professional* fields.

(b) Each member of the Committee shall be appointed by the Director with the concurrence of the National Science Board. The Chairperson of the National Science Board Committee on Minorities and Women shall be an ex officio member of the Committee. Members of the Committee shall be appointed to serve for a three-year, and may be reappointed to serve one additional term of three years.

(c) There shall be a subcommittee of the Committee which shall be known as the Subcommittee on Women in Science and [Technology.] *Engineering.* The Subcommittee on Women in Science and [Technology,] *Engineering* shall have responsibility for all Committee matters relating to (1) the participation in an opportunities for the education, training, and research of women in science and [technology] *engineering* and (2) the impact of science and [technology] *engineering* on women. The Subcommittee shall be composed of all the women members of the Committee and such other members of the Committee as the Committee may designate.

(d) There shall be a subcommittee of the Committee which shall be known as the Subcommittee on Minorities in Science and [Techonology.] *Engineering.* The Subcommittee on Minorities in Science and [Technology] *Engineering* shall have responsibility for all Committee matters relating to (1) the participation in and opportunities for education, training, and research for minorities in science and [technology] *Engineering* and (2) the impact of science and [technology] *engineering* on minorities. The Subcommittee shall be composed of all minority members of the Committee and such other members of the Committee as the Committee may designate.

(e) The Committee may organize such additional standing or ad hoc subcommittees as the Committee finds appropriate.

(f) Each year the Committee shall prepare and transmit to the Director a report concerning its activities during the previous year and its proposed activites for the next year. The Director shall transmit to Congress the report, unaltered, along with comments.

BIENNIAL REPORT

Sec. 37. (a) * * *

(b) The report required by subsection (a) shall contain—

(1) an accounting and comparison, by sex, race, and ethnic group and by discipline, of the participation of women and men in scientific and [technical] *engineering* positions, including—

(A) the number of individuals in permanent and temporary and in full-time and part-time scientific and [technical] *engineering* positions by appropriate level or similar category;

(B) the average salary of individuals in such scientific and [technical] *engineering* positions;

(C) the number and type of promotional opportunities realized by individuals in such scientific and [technical] *engineering* positions;

(D) the number of individuals serving as principal investigators in federally conducted or federal supported research and development; and

(E) the unemployment rate of individuals seeking scientific and [technical] *engineering* positions;

(2) an assessment, including quantitative and other data, of the proportion of women and minorities study scientific and [technical] *engineering* fields, including mathematics and computer skills, at all educational levels; and

(3) such other data, analyses, and evaluations as the Director acting on the advice of the Committee on Equal Opportunities in Science and [Technical,] *Engineering,* determines appropriate to carry out the Foundation's functions as well as the policies and programs of this Act.

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SECTION 9 OF THE NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT FOR FISCAL YEAR 1980

SEC. 9. Notwithstanding any other provision of this or any other Act, the Director of the National Science Foundation *and the National Science Board* shall keep the Committee on Labor and Human Resources of the Senate and the Committee on Science and Technology of the House of Representatives fully and currently informed with respect to all of the activities of the National Science Foundation.

V. SECTIONAL ANALYSIS OF THE BILL, H.R. 1210

A bill to authorize appropriations for activities of the National Science Foundation for fiscal year 1986.

Section 2(a).—Authorizes appropriations to the National Science Foundation for fiscal year 1986, in the following categories:

1. Advanced scientific computing	$46,230,000
2. Astronomical, atmospheric, Earth, and ocean sciences	372,170,000
3. Biological, behavioral, and social sciences	272,050,000
4. Engineering	170,070,000
5. Mathematical and physical sciences	428,970,000
6. Scientific, technological, and international affairs	38,360,000
7. Program Development and management	69,900,000
8. Science and engineering education	82,000,000
9. United States Antarctic Program	120,100,000

Section 2(b).—Requires that from amounts authorized under subsection (a) not less than $1,000,000 shall be available for the ethics and values in science and technology program, and not less than $3,000,000 shall be available for the policy research and analysis program.

Section 2(c).—Requires that emphasis be placed on basic research to support a better understanding of the phenomena of acid rain, when obligating amounts appropriated under subsection (a)(3) for Biotic Systems and Resources, and under subsection (a)(2) for Atmospheric Research.

Section 3.—Prohibits expenditure of any funds authorized under section 2 toward the closure of a national facility without appropriate scientific review, including review by NSF's advisory committee(s) and the National Science Board.

Section 4.—Makes appropriations under authority provided in sections 2 and 6 available for obligation for time periods specified in the appropriations bill.

Section 5.—Authorizes up to $3,500 for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the Foundation.

Section 6.—Authorizes up to $1,000,000 for expenses incurred by the Foundation outside the United States, to be drawn from excess foreign currencies.

Section 7(a).—Permits transfer of funds between the categories in section 2, up to 10 percent of the amounts authorized in those categories.

Section 7(b).—Permits the Director to transfer funds between the categories in section 2 exceeding 10 percent of the amounts authorized in those categories, provided an explanation of any such proposed transfer is transmitted in writing to the Speaker of the

House, President of the Senate, and the appropriate authorizing Committees of the House and Senate, and 30 calendar days have passed after the transmission of such explanation.

Section 8.—Authorizes the National Science Foundation to design, establish and maintain a data collection and analysis capability for the purpose of identifying and assessing the research facilities needs of universities, The Foundation is authorized to conduct the necessary surveys every two years and report the results to Congress, the first report due by September 1, 1986.

Section 9(a)-(c).—Amends section 6 of the National Science Foundation Act of 1950 and section 5316 of the U.S. Code to remove the requirement that Assistant Directors be appointed by the President.

Section 10(a).—Amends the National Science Foundation Act of 1950 to remove obsolete language requiring that National Science Board members be notitified of meetings by certified or registered mail.

Section 10(b).—Amends the National Science Foundation Act of 1950 to permit the National Science Board to delegate authority to the Director to make contracts, grants and other arrangements. Any such delegation of authority may not exceed two years, and the Board must report to Congress every two years on actions taken.

Section 10(c).—Removes a provision banning National Science Foundation employees for owning patents resulting from NSF-related work.

Section 10(d).—Changes the text of section 9 of the National Science Foundation Act of 1950 to provide more flexibility to the National Science Board in establishing special commissions authorized under section 4(h) of the Act.

Section 10(e).—(1) Removes language in the National Science Foundation Act of 1950 forbidding the Director, Deputy Director, or any Assistant Director from holding any other positions or office while employed by NSF, and (2) Amends the Act to prohibit the disclosure of information supplied to the Foundation through surveys and questionnaires unless such information has been put into a form that does not allow identification of the supplier; names of suppliers may not be made public.

Section 10(f).—Repeals language in Public Law 95-99, so as to remove unnecessary codification regarding financial disclosure by NSF employees.

Section 10(g).—Amends Public Law 94-86 to eliminate the statutory limits on the terms and amounts of grants made under the Alan T. Waterman Award.

Section 10(h).—Repeals language in Public Law 95-99 so as to remove unnecessary codification regarding Resource Centers for Science and Engineering.

Section 10(i).—Amends Public Law 96-44 to include the National Science Board in the requirement that House and Senate authorizing committees be kept fully informed of the activities of the National Science Foundation.

Section 11(a)-(c).—Amends the National Science Foundation Act of 1950 as follows:

(1) Section 3(a)(1) of the Act is amended to state that the Foundation is authorized and directed—

> (1) to intiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all level in the mathematical, physical, medical, biological, social, and other sciences, and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific, engineering, and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

(2) Sections 3a(3), (3)a(4), 3(a)5, 3(a)(6), 3(a)(7); 3(b); 3(c); 3(d); 3(e); 4(c); sections 10, 11, 12; 13(a). 13(b); 14; 15(b); section 2(b) of Public Law 94-86; as well as Part B of Public Law 95-516 are all amended by addition of words to conform them to the intent expressed in section 3(a)(1).

Section 12.—Requires that within 90 days of enactment of this Act, the Director of NSF shall review the Grace Commission's recommendations and report to the Speaker of the House and appropriate committees of the House and Senate on the implementation of those recommendations which affect NSF.

Amends the title of the bill to read: "A bill to authorize appropriations to the National Science Foundation for the fiscal year 1986, and for other purposes".

VI. Oversight Activities

HEARINGS

Testimony was given by NSF personnel or others on NSF related matters at oversight hearings held by the Committee between April 1984 and March 1985:

National Science Foundation autorization hearings.

Posture Hearings on U.S. Science—February 6, 1985.

Non-Government witnesses on NSF programs—February 20, 1985.

Director's overview and explanation of NSF Programs—February 21, 1985.

Other related hearings

Improving the Research Infrastructure at U.S. Universities and Colleges—May 8, 1984.

Hazards Associated with Earthquakes in the Eastern U.S.—May 23, 1984.

Scientific Communication and National Security—May 24, 1984.

Computer Literacy Act (HR 3750) and National Education Software Act (HR 4628)—June 5, 1984.

Federal Organization for Technological Innovation—June 12, 1984.

INSPECTION OF NSF SUPPORTED FACILITIES

NSF projects at the University of Washington, Seattle; New Mexico Institute of Mining and Technology; and the Very Large Array Radiotelescope Facility—July 12-14, 1984.

NSF projects and laboratories at the University of Vermont, Dartmouth College, University of Rhode Island, the Woods Hole Oceanographic Institution, and the Woods Hole Marine Biological Laboratory—July 8-14, 1984.

NSF activities at Harvard University, Massachusetts Institute of Technology, and the Woods Hole Oceanographic Institute—October 11-12, 1984.

NSF projects at the University of Pittsburgh and the Westinghouse Research and Development Center—October 29-30, 1984.

Federal Laboratory Consortium Meeting in Seattle, Washington—October 30, 1984.

NSF Projects at the University of Hawaii and research facilities; the University of California, Berkeley; and the Lawrence Berkeley Laboratory—December 5-14, 1984.

Oversight of molecular biology research at Whitehead Institute—January 9, 1985.

Oversight of genetic engineering in agriculture at Agracetus in Middleton, Wisconsin—January 28, 1985.

ATTENDANCE AT NSF MEETINGS

Committee staff members have attended, or have studied reports of, numerous NSF meetings of the following types: National Science Board meetings, program reviews, program planning sessions, scientific conferences, meetings of the Committee on Equal Opportunities in Science and Technology, and advisory committee meetings.

They have also met with NSF personnel on a variety of working topics including: accountability in research and grant management; history, nature, and accomplishment of selected programs; evaluation procedures for grant proposals, amendments to NSF Organic Act, and Directorate-by-Directorate pre-budget reviews of programs, problems, and plans.

GAO REPORTS

The General Accounting Office issued one report in the past year dealing with the National Science Foundation:

"Studies of U.S. Universities' Research Equipment Needs Inconclusive"—April 3, 1984.

VII. Oversight Findings and Recommendations by the Committee on Government Operations

No statement of findings and recommendations on oversight activity pursuant to Rule X, clause 2(b)(2), and Rule XI, clause 2(1)(3)(D), of the Rules of the House of Representatives, have been submitted by the Committee on Government Operations for inclusion in this report.

VIII. CONGRESSIONAL BUDGET ACT COST ESTIMATE

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, April 9, 1985.

Hon. DON FUQUA,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for H.R. 1210, a bill to authorize appropriations to the National Science Foundation for the fiscal year 1986, and for other purposes.

If you wish further details on this estimate, we will be pleased to provide them.

With best wishes,

Sincerely,

RUDOLPH G. PENNER.

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: H.R. 1210.

2. Bill title: A bill to authorize appropriations to the National Science Foundation for the fiscal year 1986, and for other purposes.

3. Bill status: As amended and ordered reported by the House Committee on Science and Technology, April 3, 1985.

4. Bill purpose: This bill authorizes the appropriation of $1,568.4 million for fiscal year 1986 for various activities of the National Science Foundation (NSF). Of this total, $1,397.8 million is for research and related activities, $50.6 million is for science and engineering education, and $120.1 million is for the U.S. Antarctic program. Additionally, an appropriation not to exceed $1 million is authorized for payment of expenses incurred outside of the United States. This payment is to be made from excess foreign currencies held by the Treasury.

This bill also makes a number of amendments to the National Science Foundation Act of 1950. The amendments with possible budget implications would remove the requirement that the President appoint four assistance directors and would allow the NSF to adjust the amount and terms of its Alan T. Waterman award.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1986	1987	1988	1989	1990
Authorization level	1,569				
Estimated outlays	798	533	152	86	

The costs of this bill fall within budget function 250.

Basis of estimate:

For the purposes of this estimate, it was assumed that all funds would be appropriated prior to the beginning of the fiscal year 1986 and that obligations and disbursements would follow historical patterns. Although the bill authorizes the appropriation of $82 million for science and engineering education, the above estimate includes only $50.5 million of that amount. The estimate is based upon the statement of the Committee on Science and Technology that the $82 million is intended to encompass total available funding for this program in 1986—including $31.5 million that has been deferred from 1985 and that would not require appropriation action.

The amendments in this bill would not result in significant costs to the Federal Government.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: On April 9, 1985, CBO prepared an estimate for a bill to authorize appropriations for the NSF, as ordered reported by the Senate Committee on Commerce, Science, and Transportation. The direct budget impact of the Senate bill is identical to that of H.R. 1210. However, the Senate bill authorizes the indemnification of the private contractors in its ocean drilling program, a provision that increases the potential liability of the Federal Government. H.R. 1210 contains no such provisions.

9. Estimate prepared by: Paul M. DiNardo.

10. Estimate approved by: C.G. Nuckols (for James L. Blum, Assistant Director for Budget Analysis).

IX. IMPACT ON INFLATION

In accordance with Rule XI, clause 2(1)(4) of the Rules of the House of Representatives, the following statement is made concerning the inflationary impact of H.R. 1210.

H.R. 1210 is assessed to have no inflationary effect on prices and costs in the operation of the national economy.

X. COMMITTEE RECOMMENDATION

A quorum being present, the bill was ordered reported on April 3, 1985, by a voice vote of the Committee.

XI. ADMINISTRATION VIEWS

NATIONAL SCIENCE FOUNDATION
WASHINGTON D C 20550

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OFFICE OF THE
DIRECTOR

February 4, 1985

Honorable Thomas P. O'Neil
Speaker of the House of
Representatives
Washington, D.C. 20515

Dear Mr. Speaker:

I am pleased to forward a draft authorization bill for the National Science Foundation for fiscal years 1986 and 1987. Enclosed also is a sectional analysis of the bill.

This draft authorization bill is very similar to that submitted for this fiscal year. The amounts recommended for authorization are different, of course, but only four significant changes were made. In section 7 of the draft bill, we have modified one of the seven amendments that we proposed last year so that it will accomplish an additional purpose. Also in section 7, we have added a new amendment and modified another at the request of the National Science Board. All eight proposed amendments are described in the enclosed explanation of section 7. Finally, section 8 of the accompanying bill contains a series of minor amendments that will incorporate references to "engineering" and "engineers" into the National Science Foundation Act. An explanation of this section is also enclosed.

The Office of Management and Budget has advised us that enactment of the proposed bill would be in accord with the program of the President.

Sincerely yours,

Erich Bloch
Director

Enclosures

Authorization Bill - Fiscal Years 1986 and 1987

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Science Foundation Authorization Act for Fiscal Years 1986 and 1987."

Sec. 2(a) There is authorized to be appropriated to the National Science Foundation $1,568,400,000 for the fiscal year 1986 and such sums as may be necessary for the fiscal year 1987.

(b) Funds authorized for the fiscal year 1986 will be available for the following categories:

(1) Advanced Scientific Computing, $46,230,000.

(2) Astronomical, Atmospheric, Earth and Ocean Sciences, $372,170,000.

(3) Biological, Behavioral, and Social Sciences, $272,050,000.

(4) Engineering, $170,070,000.

(5) Mathematical and Physical Sciences, $428,970,000.

(6) Scientific, Technological, and International Affairs, $38,360,000.

(7) Program Development and Management, $69,900,000.

(8) Science and Engineering Education, $50,550,000.

(9) United States Antarctic Program, $120,100,000.

Sec. 3. Appropriations made under authority provided in sections 2 and 5 shall remain available for obligation for periods specified in the Acts making the appropriations.

Sec. 4. From appropriations made under authorizations provided in this Act, not more than $3,500 for fiscal year 1986 and such sums as may be necessary for fiscal year 1987 may be used for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the National Science Foundation. His determination will be final and conclusive upon the accounting officers of the Government.

Sec. 5. Besides the sums authorized by section 2, not more than $1,000,000 for fiscal year 1986 and such sums as may be necessary for fiscal year 1987 are authorized to be appropriated for expenses of the National Science Foundation incurred outside the United States, to be drawn from foreign currencies that the Treasury Department determines to be excess to the normal requirements of the United States.

Sec. 6. Funds may be transferred among the categories listed in section 2(b), so long as the net funds transferred to or from any category do not exceed 10 percent of the amount authorized for that category in section 2. The Director of the Foundation may propose transfers to or from any category exceeding 10 percent of the amounts authorized for that category in section 2. An explanation of any such proposed transfer must be transmitted in writing to the Speaker of the House, the President of the Senate, the Senate Committee on Labor and Human Resources, and the House Committee on Science and Technology. The proposed transfer may be made only when thirty calendar days have passed after submission of the written proposal.

Sec. 7(a) Subsection 4(e) of the National Science Foundation Act of 1950, as amended, is amended by deleting from the last sentence the words "by registered mail or certified mail mailed to his last known address of record".

(b) Subsection 5(e) of the National Science Foundation Act of 1950, as amended, is amended to read:

> (e) The Director may make contracts, grants, and other arrangements pursuant to section 11(c) only with prior approval of the Board or under authority delegated by the Board, and subject to such conditions as the Board may specify.

(c) Subsection 12(b) of the National Science Foundation Act of 1950, as amended, is deleted and the preceding subsection is redesignated by striking the "(a)".

(d) Section 9 of the National Science Foundation Act of 1950, as amended, is amended to read as follows:

> (a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.
>
> (b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering.

(e) Section 14 of the National Science Foundation Act of 1950, as amended, is amended as follows:

(1) Subsection (b) is deleted;

(2) Subsections (c) through (i) are redesignated as subsections (b) through (h) and all references to those subsections are changed accordingly; and

(3) A new subsection is added to the end as follows:

> (i) Information supplied to the Foundation or a contractor of the Foundation by an industrial or commercial organization in survey forms, questionaires, or similar instruments for the purposes of subsections (a)(5) or (a)(6) of section 3 of this Act may not be disclosed to the public unless such information has been transformed into statistical or aggregate formats that do not allow the identification of the supplier. The names of organizations supplying such information may not be disclosed to the public.

(f) Section 10 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted.

(g) Section 6(a) of Public Law 95-99, the National Science Foundation Authorization Act, 1976, as amended by section 22(b) of the National Science Foundation Authorization (1981) and Science and Technology Equal Opportunities Act, is amended:

(1) by deleting the phrase "a grant not to exceed $50,000 per year for a period not to exceed three years" from its final sentence, and

(2) by adding to its end the following sentence: "The National Science Board will periodically establish the amount and term of such grants."

(h) Section 6 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted and the sections following it all renumbered accordingly.

Section 8(a). The National Science Foundation Act of 1950, as amended (42 U.S.C. 1861 to 1875) is amended as follows.

(1) Section 3(a)(1) [42 U.S.C. 1862(a)(1)] is amended --

(A) by striking "engineering,";

(B) by inserting after "other sciences," the following: "and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering,"; and

(C) by striking the words "such scientific and educational activities" and inserting in lieu thereof "such scientific, engineering, and educational activities".

(2) Section 3(a)(3) is amended --

(A) by inserting "and engineering" immediately after "scientific"; and

(B) by inserting "and engineers" immediately after "scientists".

(3) Section 3(a)(4) is amended --

(A) by inserting "and engineering" immediately after "scientific"; and

(B) by inserting "and engineering" immediately after "sciences".

(4) Section 3(a)(5) is amended by inserting "and fields of engineering" immediately after "sciences".

(5) Section 3(a)(6) is amended by striking "technical" each place it appears and inserting in lieu thereof "engineering".

(6) Section 3(a)(7) is amended by inserting "and engineering" immediately after "scientific".

(7) Section 3(b) is amended by inserting "and engineering" immediately after "scientific" each place it appears.

(8) Section 3(c) is amended --

(A) by inserting "and engineering" immediately after "scientific" in the first sentence; and

(B) by inserting "and engineering research" immediately after "applied scientific research" in the second sentence.

(9) Section 3(d) is amended by striking "basic research and education in the sciences" and inserting in lieu thereof "research and education in science and engineering".

(10) Section 3(e) is amended by inserting "and engineering" immediately after "sciences".

(11) Section 4(c) (42 U.S.C. 1863(c)) is amended --

(A) by inserting "and engineering" immediately after "scientific" in clause (3) of the first sentence;

(B) by inserting "and engineers" immediately after "scientists" in the second sentence; and

(C) by inserting "the National Academy of Engineering," immediately after "National Academy of Sciences," and by inserting ", engineering," immediately after "scientific" in the third sentence.

(12) The first sentence of section 10 (42 U.S.C. 1869) is amended by striking "scientific study or scientific work in the mathematical, physical, medical, biological, engineering, social, and other sciences" and inserting in lieu thereof "study and research in the sciences or in engineering".

(13) Section 11 (42 U.S.C. 1870) is amended --

(A) by inserting "or engineering" immediately after "scientific" each place it appears in subsections (c) and (d);

(B) by replacing the word "technical" with the word "engineering" in subsection (g); and

(C) by replacing the words "scientific value" with the words "scientific or engineering value" in subsection (g).

(14) Section 12 (42 U.S.C. 1871) is amended by inserting "or engineering" immediately after "scientific".

(15) Section 13(a) (4 U.S.C. 1872(a)) is amended --

(A) by inserting "or engineering" immediately after "scientific" each place it appears in the first two sentences;

(B) by inserting "or engineers" immediately after "scientists"; and

(C) by striking "scientific study or scientific work" and inserting in lieu thereof "study and research in the sciences or in engineering".

(16) Section 13(b) is amended by inserting "or engineering" immediately after "scientific".

(17) Section 14 (42 U.S.C. 1873) is amended --

(A) by inserting "or engineering" immediately after "scientific" each place it appears in subsection (f); and

(B) by striking "technical" in subsection (g) and inserting in lieu thereof "engineering".

(18) Section 15(b) (42 U.S.C. 1874(b)) is amended --

(A) by striking "technical" in paragraph (1) and inserting in lieu thereof "engineering"; and

(B) by inserting "or engineering" immediately after "scientific" in paragraph (2).

(b) Section 2(b) of the National Science Foundation Authorization Act, 1974 (42 U.S.C 1869a, P.L. 94-86) is amended by inserting "or engineering" immediately after "science" each place it appears.

(c) Part B of the National Science Foundation Authorization (1981) and Science and Technology Equal Opportunities Act (42 U.S.C. 1885 to 1885d) is amended as follows.

(1) Section 32(a) (42 U.S.C. 1885(a)) is amended --

(A) by striking the word "technology" and inserting in lieu thereof "engineering"; and

(B) by striking the words "scientific talent and technical skills" and inserting in lieu thereof "scientific and engineering talents and skills".

(2) The first sentence of section 32(b) (42 U.S.C. 1885(b)) is amended --

(A) by striking the words "skills in science and mathematics" and inserting in lieu thereof "skills in science, engineering, and mathematics";

(B) by striking the word "technical" and inserting in lieu thereof "engineering";

(C) by striking the words "scientific literacy" and inserting in lieu thereof "scientific and engineering literacy"; and

(D) by striking the word "technology" and inserting in lieu thereof "engineering".

(3) The second sentence of section 32(b) (42 U.S.C. 1885(b)) is amended --

(A) by striking the words "highest quality science" and inserting in lieu thereof "highest quality science and engineering"; and

(B) by striking the word "technology" and inserting in lieu thereof "engineering".

(4) The third sentence of section 32(b) (42 U.S.C. 1885(b)) is amended by striking the word "technology" and inserting in lieu thereof "engineering".

(5) Section 33 (42 U.S.C. 1885a) is amended --

(A) by striking the words "technology" and "technical" each place they appear and inserting in lieu thereof "engineering";

(B) by inserting the word ", engineering" after "science" in subsection 33(2);

(C) by inserting the words "and engineers" after "scientists" both places it appears;

(D) by inserting the words "and engineering" after "science" in subsection 33(10); and

(E) by striking the words "science, engineering, and technology" in subsection 33(11) and inserting in lieu thereof "science and engineering".

(5) Section 34 (42 U.S.C. 1885b) is amended --

(A) by striking the words "science education" and inserting in lieu thereof "science and engineering education"; and

(B) by striking the word "technology" and inserting in lieu thereof "engineering".

(6) Section 36 (42 U.S.C. 1885c) is amended --

(A) by striking the word "Technology", or "technology", each place it appears and inserting in lieu thereof "Engineering", or "engineering"; and

(B) by striking the words "scientific, engineering, professional, and technical" and inserting in lieu thereof "scientific, engineering, and professional".

(7) Section 37(b) (42 U.S.C. 1885d(b)) is amended --

(A) by striking the word "technical" each place it appears and inserting in lieu thereof "engineering"; and

(B) by striking the word "Technology" in subsection (3) and inserting in lieu thereof "Engineering".

(8) As here amended, this Act may be cited as the "Science and Engineering Equal Opportunities Act".

SECTIONAL ANALYSIS - NSF FY 1986-1987 Authorization Bill

A bill to authorize appropriations for activities of the National Science Foundation, and for other purposes.

Sec. 1. Permits the citation of the Act as the "National Science Foundation Authorization Act for Fiscal Years 1986 and 1987."

Sec. 2. Authorizes appropriations in nine categories totaling $1,568,400,000 for FY 1986 and such sums as may be necessary for FY 1987.

Sec. 3. Provides that appropriations made under sections 2 and 5 remain available for periods specified in appropriations acts.

Sec. 4. Authorizes expenditures of up to $3,500 for FY 1986 and such sums as may be necessary for FY 1987 for official consultation, representation, and other extraordinary expenses at the discretion of the Director.

Sec. 5. Authorizes, besides the appropriations in section 2, an appropriation not to exceed $1,000,000 for FY 1986 and such sums as may be necessary for FY 1987, for expenses of the National Science Foundation incurred outside the United States to be drawn from excess foreign currencies.

Sec. 6. Provides that funds may be transferred among categories but precludes transfers to or from any category exceeding 10 percent of the amount listed for that category until thirty calendar days have passed after the Director has notified the Speaker, the Vice President, and the Senate and House authorization committees of the nature of the transfer and the reason for it.

Sec. 7. Makes several amendments to the NSF Act.

Sec. 8. Makes a series of amendments to the NSF Act to add references to "engineering" and "engineers".

Section 7 of NSF FY 1986-1987 Authorization Bill:

Proposed Changes to National Science Foundation Act of 1950

The submitted bill would make eight amendments to the National Science Foundation Act and related laws. All the proposed changes would serve a broad long-term purpose. They represent a continued collaboration between the Foundation and the congressional committees charged with oversight of its activities to simplify and streamline its organic legislation.

Five of these amendments (Proposed Changes numbers 1, 3, 4, 6, and 8) were submitted to Congress last year. Proposed Changes #2 and #5 have been substantially changed. Proposed Change #7 is new. All these amendments are explained below.

This year, the proposed amendments are in the order that the affected sections appear in the United States Code.

Proposed Change #1. "Section 4(e) of the National Science Foundation Act of 1950, as amended, is amended by deleting from the last sentence the words 'by registered mail or certified mail mailed to his last known address of record'."

Explanation of Proposed Change #1. Section 4(e) of the National Science Foundation Act [42 U.S.C. §1863(e)] now requires that National Science Board members be notified of meetings by registered or certified mail. The proposed amendment deletes that requirement, allowing such notice to be conveyed in any reasonable manner.

The requirement serves no useful purpose. Regular National Science Board meetings are scheduled months in advance, to give members time to adjust their teaching, research, and other responsibilities. The formal certified mail notice is a mere formality and is technologically obsolete in light of new communications methods, such as electronic mail, that the Board now uses.

No increase in cost or personnel will result if the proposal is enacted.

Proposed Change #2. "Subsection 5(e) of the National Science Foundation Act of 1950, as amended, is amended to read:

> (e) The Director may make contracts, grants, and other arrangements pursuant to section 11(c) only with prior approval of the Board or under authority delegated by the Board, and subject to such conditions as the Board may specify."

Explanation of Proposed Change #2. This amendment is submitted at the request of the National Science Board, which believes the change would enable the Board to exercise more effective review and oversight of NSF program implementation.

Subsection 5(e) [42 U.S.C. §1864(e)] now reads:

> (e) The Director shall not make any contract, grant, or other arrangement pursuant to section 11(c) without the prior approval of the Board, except that a grant, contract, or other arrangement involving a total commitment of less than $2,000,000 or less than $500,000 in any one year or a commitment of such lesser amount or amounts and subject to such other conditions as the Board in its discretion may from time to time determine to be appropriate and publish in the Federal Register, may be made if such action is taken pursuant to the terms and conditions set forth by the Board, and if each such action is reported to the Board at the Board meeting next following such action.

The original NSF Act required that the Board approve all awards. 64 Stat. 149, 151; section 5(b) of P.L. 81-507. As the Foundation grew and this became impracticable, the Board obtained in 1959 authority to delegate award approval authority to the Director. 73 Stat. 467, section 3 of P.L. 86-232. The current provision, enacted in 1968 as part of a major NSF Act revision, imposed as statutory limits on the Board's power to delegate award-approval authority to the Director the limits the Board was then placing on the authority it had delegated. 82 Stat. 360, 363, section 3 of P.L. 90-407.

The proposed amendment would eliminate the dollar limits on the Board's power to delegate award-approval authority to the Director. The Board would be explicitly authorized to specify conditions in its approvals and delegations.

The proposed amendment would also eliminate the requirements that the conditions of the Board's delegations to the Director be published in the Federal Register and that every award made under such delegations be reported at the Board's next meeting. Publication of NSB delegations to the Director serves no purpose. All such delegations will, of course, be made available on request from any interested party. Elimination of the "next meeting" reporting requirement will allow the Board to determine when and how it wishes to be informed of awards.

Finally, the proposed amendment changes the statutory language from "The Director shall not . . . except" to "The Director may . . . only". This is no change in substance, but the revised language is easier to understand.

Enactment of the proposed amendment would confirm the Board's recent determination to create more appropriate mechanisms for oversight of NSF program implementation. The Board believes it should review and influence major program implementation decisions broadly across the NSF. It has found the traditional review and approval of pending awards above the statutory ceilings an unsatisfactory mechanism for doing so for four reasons.

First, it brings to the NSB only a small and distorted selection of award actions that fails to cover many NSF programs and program-implementation issues. Only about three-tenths of one percent of all 1984 awards were reviewed by that process. Almost all these came from two directorates. None came from 18 of the NSF's 28 divisions. None came from 153 of its 177 programs. Since each award has been reviewed more or less independently, moreover, the process has not naturally surfaced many program-implementation decisions that involve terms and criteria for proposal competition or allocation of funds within programs.

Second, individual awards come up out of context. A major award likely represents the outcome of broader program decisions that preceded it -- concerning balance within a program between big and little science or among subdisciplines of the science, concerning eligibility and criteria for awards, concerning the review process to be followed, or concerning other things that affect multiple awards. These key program decisions are not naturally brought to focus by review of an individual award.

Third, the award-approval requirement involves the Board well after the major program decisions have been made -- too late for effective oversight. By the time staff review of a proposal has been completed and a proposed award is ready for Board approval, most such significant issues have been resolved and acted on in the review process, if not earlier. At this late stage, moreover, reversing the earlier underlying program decisions by disapproving a pending major award may be quite impractical. Realizing that, the Board has looked into program implementation at earlier stages by a variety of mechanisms. But the time available for such mechanisms has been restricted, because thoroughgoing review of proposed awards at the end of the process takes much of the time the Board has available for review of program implementation. Historically, it has taken most of that time.

Finally, the traditional award-approval process takes up Board time on many awards and issues related to them that do not deserve attention from the Board. The major program decisions, again, were typically taken at earlier stages. Moreover, most of the awards reviewed are not big enough to affect the NSF as a whole. Of the awards reviewed in 1984, for example, only eight accounted individually for as much as half a percent of the NSF budget for research and education. Many others accounted for less than a tenth of a percent each.

For these and other reasons the Board has begun using other mechanisms for review and oversight of program implementation. Though the details of these mechanisms are still being worked out at the time of this submission, they will include:

1. In-depth review of significant new programs before their inception;
2. Review of other programs or major projects that involve technical risks, evoke high Congressional or public interest, court administrative or other difficulties, generate controversy, or otherwise deserve high-level scrutiny; and
3. Annual directorate-by-directorate review of all NSF programs.

The Board would, of course, continue to review proposed individual awards that involve special policy issues, that previously occasioned Board concern, or that otherwise appear strategically important.

Implementing such new review and oversight mechanisms will require that the Board reduce the time it now spends on the award-approval process. Consequently, until enactment of the proposed amendment eliminates the statutory requirement for award approval, the Board intends to institute a "fast-track" procedure for approval of awards above the statutory limits that the Board and the Director find to be routine from the standpoint of senior policymakers. Under this procedure, the Board will receive from the Director only a one- or two-page summary describing the award and recommending approval, which normally will be given with little or no further scrutiny.

Although this "fast-track" procedure will reduce the hours the Board must spend on routine awards, handling such awards will still use time that might be better used. Enactment of the proposed amendment would eliminate this drain on the Board's time. It would also signal Congressional approval for the Board's efforts to make its oversight of NSF program implementation more effective.

No increase in cost or personnel will result from enactment of the proposed amendment.

Proposed Change #3. "Section 9 of the National Science Foundation Act of 1950, as amended, is amended to read as follows:

> (a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.
>
> (b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering."

Explanation of Proposed Change #3. Section 4(h) of the National Science Foundation Act [42 U.S.C. §1863(h)] authorizes the National Science Board to establish "special commissions" from time to time as it may deem necessary for the purposes of the NSF Act. Such a commission can be a useful means of focusing the attention of distinguished scientists and other citizens on specific problems relating to science. However, restrictions on the composition and duties of special commissions imposed in section 9 of the Act (42 U.S.C. §1868) unfortunately limit their value and therefore their use.

Section 9(b) restricts any special commission to making a "comprehensive survey of research" and formulating and recommending to NSF an "over-all research program" for a particular scientific field of study. The Foundation believes that special commissions would be more helpful and used more often if the commissions' writs could be drawn more broadly. The proposed amendment would authorize the Board to establish special commissions to study and make recommendations on any issues relating to the principal areas of responsibility of the National Science Foundation.

Section 9(a) restricts the membership of any special commission to six scientists and five nonscientists. Though this may be a good number and a good distribution for many cases, it is extraordinarily rigid. In many cases it would prevent selection of the best mix of scientists who are experts or specialists in the issues to be addressed, scientists who are not specialists in those issues, and nonscientists. The proposed amendment would allow the Board discretion to take account of the subject and the circumstances in fixing the size of a special commission and determining its composition.

No significant increase in cost or personnel will result if the proposal is enacted. Moreover, most, if not all, special commissions established would be subject to the requirements of the Federal Advisory Committee Act.

Proposed Change #4. "Subsection 12(b) of the National Science Foundation Act of 1950, as amended, is deleted and the preceding subsection is redesignated by striking the '(a)'."

Explanation of Proposed Change #4. Subsection 12(b) of the NSF Act [42 U.S.C. §1871(b)] bans an NSF employee from owning a United States patent on any invention made in connection with and directly relating to the subject matter of his or her assigned duties.

The Foundation is believed to be the only Federal agency to have a statutory provision governing the allocation of rights to inventions made by its employees. All other agencies are governed by Executive Order 10096, as amended, which permits Federal employee-inventors to retain principal patent rights to their inventions under certain circumstances. (See Section 1(c) of E.O. 10096 and the implementing regulations of the Patent and Trademark Office published at 37 CFR Part 100.) No reason is known for this special restriction on the Foundation's employees. The provision probably resulted from a general congressional concern over the treatment of Federal employees' inventions, which President Harry Truman assuaged by issuing E.O. 10096 in January 1950, just four months before the NSF Act became law.

As far as can be determined, the provision has had no actual effect. The NSF, after all, performs no "in-house" research likely to produce inventions. Only one invention has ever been reported by a Foundation employee.

Deletion of this provision would simplify the law and remove an inequitable distinction between the Foundation's employees and those of other Federal agencies.

No increase in cost or personnel will result if the proposal is enacted.

Proposed Change #5. "Section 14 of the National Science Foundation Act of 1950, as amended, is amended as follows:

(1) Subsection (b) is deleted;

(2) Subsections (c) through (i) are redesignated as subsections (b) through (h) and references to those subsections are changed accordingly; and

(3) A new subsection is added to the end as follows:

> (i) Information supplied to the Foundation or a contractor of the Foundation by an industrial or commercial organization in survey forms, questionaires, or similar instruments for the purposes of subsections (a)(5) or (a)(6) of section 3 of this Act may not be disclosed to the public unless such information has been transformed into statistical or aggregate formats that do not allow the identification of the supplier. The names of organizations supplying such information may not be disclosed to the public."

Explanation of Proposed Change #5. This amendment removes an unnecessary limitation on the activities of senior Foundation officials and adds a statutory assurance of the confidentiality of NSF-collected survey data. The first part of this amendment was submitted to Congress last year. The last part is new.

Repeal of subsection 14(b).

The first subsection of the proposed amendment deletes the present subsection 14(b) of the National Science Foundation Act of 1950, as amended [42 U.S.C. §1873(b)]. That subsection now provides:

> Neither the Director, Deputy Director, nor any Assistant Director shall engage in any other business, vocation, or employment while serving in such position; nor shall the Director, the Deputy Director, or any Assistant Director, except with the approval of the [National Science] Board, hold any office in, or act in any capacity for, any organization, agency, or institution with which the Foundation makes any grant, contract, or other arrangement under this Act.

The provision dealt with one of the hotter issues at the time the NSF Act became law, but has outlived its purpose.

In 1947 President Truman vetoed the first National Science Foundation Act to pass the Congress because:

> "It would, in effect vest the determination of vital national policies, the expenditure of large public funds, and the administration of important governmental functions in a group of individuals who would be essentially private citizens."

President Truman objected in particular to provisions in the bill that would have vested these powers in part-time members of the Foundation, their part-time Executive Committee, and part-time divisional committees for the major parts of the Foundation. "[R]esponsibility for the administration of the law should be vested in full-time officers who can be held accountable . . .", he said.

What is now section 14(b) of the National Science Foundation Act was added for the apparent purpose of ensuring that this objection was fully met. "The Director and his deputy," summarized the Senate Committee, "are to devote full-time to the Foundation." S. Rep. No. 1151, 80th Cong., 2d Sess. 5 (1948). Amendments to the Act in 1968 added four presidentially-appointed Assistant Directors and subjected them to the same bar on part-time service as the two top officials.

The original issue is now all but forgotten. No one doubts that the Director, Deputy Director, and Assistant Directors of the NSF are to be full-time Federal officials like their counterparts in any other Federal agency. Moreover, the Foundation has grown larger than was originally foreseen and could not now feasibly be run by part-time officials.

The sweeping language of the provision regarding "any other business, vocation, and employment" has remained, however, to cast some doubt on the right of an NSF Director, Deputy Director, or Assistant Director to have outside interests such as would be permitted to other full-time Government executives. Section 210 of the Ethics in Government Act of 1978 (5 U.S.C. App. I) now curbs outside activities of such Presidentially appointed executives by limiting their outside earned income to 15 percent of Government salary. NSF executives need not be subject to additional restrictions. Removal of this now-outdated provision will eliminate unnecessary legal questions.

Redesignation of following subsections.

The second subsection of the proposed amendments redesignates subsections 14(c) through 14(i) of the National Science Foundation Act of 1950, as amended [42 U.S.C. §§1873(c) through 1873(i)], as subsections 14(b) through 14(h) to compensate for the deletion of the present subsection 14(b), and makes corresponding changes in all references to those sections. Because the only references to the redesignated subsections appear to be in subsections 3(b) and 15(b)(1) of the NSF Act [42 U.S.C. §§1862(b) and 1874(b)(1)], no other law should be affected. Both references are to "section 14(g)" and will become "section 14(f)".

Addition of a new subsection (i).

The final subsection of the proposed amendment adds to the end of section 14, as amended and redesignated, language assuring that the Foundation cannot be compelled under the Freedom of Information Act (5 U.S.C. §552) to disclose information gathered from commercial or industrial organizations or the names of organizations supplying such information. The new section 14(i) would put NSF survey data under "Exemption (b)(3)" of the Freedom of Information Act [5 U.S.C. §552(b)(3)].

The Foundation believes that such a statutory exemption from the Freedom of Information Act is necessary for it to continue:

> to evaluate the status and needs of the various sciences as evidenced by programs, projects, and studies undetaken by . . . private research groups; [and]
>
> to provide a central clearinghouse for the collection, interpretation, and analysis of data on the availability of, and

> the current and projected need for, scientific and technical resources in the United States, and to provide a source of information for policy formulation by other agencies of the Federal Government.

[NSF Act, subsections 3(a)(5) and 3(a)(6)].

As America's scientific and technological infrastructure has become increasingly dynamic and complex, the information needed to identify and understand important developments and trends has changed. Policymakers are asking the Foundation not only for more and more detailed information on financial and human resources allocated to research activities in so-called "high technology" industries, but also for data on the factors underlying allocation decisions. The highly competitive nature of such industries, however, makes firms reluctant to provide the kinds of information needed to anticipate and interpret industry-wide trends without guarantees of confidentiality and anonymity. The firms fear that proprietary data may find its way into the hands of a commercial rival or that incorrect forecasts will come back to haunt them. This fear is crippling the Foundation's ability "to provide a source of information for policymakers".

An example of the effect that fear of disclosure is having on the Foundation's information-gathering activities is the current NSF effort to create a database on biotechnology research and development. Representatives of the Foundation's Division of Science Resources Studies have discussed such a database with numerous individuals in industry, government, universities, and nonprofit organizations. Almost everyone contacted thought that such a database would be a valuable source of information on status and needs of biotechnology. However, many organizations, mainly but not exclusively in the industrial sector, indicated that they would not supply information to such a database unless the confidentiality of their input was assured. Three important companies -- Biogen N.V., Cetus, and Genetech -- stated that they would not release any proprietary information to the NSF without guarantees of confidentiality and anonymity and they suspected that smaller, privately-held firms would be even less forthcoming. This reluctance to supply proprietary data without an assurance that it will not be further disclosed may preclude development of a biotechnology R&D database. Many firms consider proprietary, and therefore would not reveal, even the fact that they are doing research in a particular area. Data on specific research objectives, numbers of scientists and engineers employed on particular projects, and project costs are even more sensitive.

Other instances in which the Foundation's inability to guarantee confidentiality has frustrated its information-gathering activities involved survey activities designed to obtain data on the impact of tax legislation on R&D spending and research plans for robotics and other emerging areas of technology.

One way that the Foundation now compensates for its inability to safeguard information from disclosure under the Freedom of Information Act is by having the annual NSF survey of industrial R&D activities conducted by the Census Bureau. That way, the data is covered by the Census Bureau's statutory exemption. Unfortunately, the terms of that exemption forbid identification of individual respondents even to the Foundation, so that NSF has no way of following up on unusual or missing responses.

The proposed amendment gives the Foundation no discretion to disclose survey data or the identity of respondents. This addresses the the reluctance of some potential respondents to giving the Foundation control over their proprietary data. That concern, or mistrust, is the reason that the existing FOIA exemption for "confidential commercial information" [5 U.S.C. 552(b)(4)], which is discretionary, is not considered adequate by potential respondents.

The Foundation's Office of the General Counsel has advised that some, perhaps all, survey data considered by firms to be proprietary might be withheld from disclosure under the "(b)(4) exemption" [5 U S.C. §552(b)(4)] or another FOIA exemption. The Foundation's authority to withhold the names of respondents to particular surveys is uncertain, however, since firm names are not generally considered privileged. Without such anonymity many firms would deline to participate in any surveys out of concern that their association with particular survey topics would permit competitors to infer sensitive elements of their research strategy. The proposed amendment is intended only to assuage the concerns of potential respondents, not to shut off any presently-used source of information.

It should be noted that the FOIA exemption provided by the new section 14(i) would be confined to survey data gathered under subsections 3(a)(5) and 3(a)(6) of the NSF Act. The exemption could not be used to prevent disclosure of any other information.

No increase in cost or personnel will result if the proposal is enacted.

Proposed Change #6. "Section 10 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted."

Explanation of Proposed Change #6. This lengthy provision, codified as 42 U.S.C. §1873a, was added in 1977 to require NSF employees to disclose any financial interests or academic affiliations that might bear on their handling of proposals or other applications. It also required that the NSF adopt implementing regulations. It is unique, as no other non-regulatory agency of the Federal Government is subject to specific statutory requirements in this area. The broader disclosure requirements of the subsequently-enacted Ethics in Government Act are now binding on all agencies, including the NSF. (In fact, under subsection (d), §1873a(d), most of this section was superseded by the Ethics in Government Act.) Moreover; all agencies are required by Executive Order 11222 to maintain conflict-of-interests regulations that deal with any problems unique to their programs and methods of operation.

The Foundation's conflict-of-interests regulations were extensively revised in 1982 (45 CFR Parts 680 through 684; published in the Federal Register, Vol. 47, No. 143, July 26, 1982, on pages 32130 through 32153). These regulations now require both disclosure of all potentially biasing affiliations or relationships and special oversight in cases involving them, with further special handling if necessary (45 CFR Part 681). The statutory provision is thus no longer necessary. Its deletion would simplify the law and allow more scope for future evolution of NSF policy in this area.

No increase in cost or personnel will result if the proposal is enacted.

Proposed Change #7. "Section 6(a) of Public Law 95-99, the National Science Foundation Authorization Act 1976, as amended by section 22(b) of the National Science Foundation Authorization (1981) and Science and Technology Equal Opportunities Act, is amended:

(1) by deleting the phrase 'a grant not to exceed $50,000 per year for a period not to exceed three years' from its final sentence, and

(2) by adding to its end the following sentence: 'The National Science Board will periodically establish the amount and term of such grants.'"

Explanation of Proposed Change #7. This change is submitted at the request of the National Science Board.

Section 6 of the Fiscal Year 1976 NSF Authorization Act (42 U.S.C. §1881a) now provides --

> (a) The National Science Foundation is authorized to establish the Alan T. Waterman Award for research or advanced study in the mathematical, physical, medical, biological, engineering, social, or other sciences. The award authorized by this section shall consist of a suitable medal and a grant not to exceed $50,000 per year for a period not to exceed three years to support further research or study by the recipient.
>
> (b) Awards under this section shall be made to recognize and encourage the work of younger scientists whose capabilities and accomplishments show exceptional promise of future achievement.
>
> (c) No more than one award shall be made under this section in any one fiscal year.

The proposed amendment would change the first paragraph to read.

> (a) The National Science Foundation is authorized to establish the Alan T. Waterman Award for research or advanced study in the mathematical, physical, medical, biological, engineering, social, or other sciences. The award authorized by this section shall consist of a suitable medal and a grant [not to exceed $50,000 per year for a period not to exceed three years] to support further research or study by the recipient. The National Science Board will periodically establish the amount and term of such grants.

(deletions bracketed, additions underlined)

This change would allow the National Science Board to adjust the terms of the Alan T. Waterman Award as it would any other NSF grant. The Board could thus adjust the amount and duration of support to remedy the effects of inflation and otherwise maintain the value of the Waterman Award compared to other grants.

No increase in personnel will result if the proposal is enacted. Any increase in the value of the award will, of course, increase its cost.

Proposed Change #8. "Section 6 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted and the sections following it all renumbered accordingly."

Explanation of Proposed Change #8. Section 6 of P.L. 95-99 (42 U.S.C. §1884) directed the Foundation to establish a Resource Center for Science and Engineering to be located at an educational institution. Four such centers have been funded.

This section of the Foundation's annual authorization act was permanently codified in the U.S. Code, apparently as a matter of codification committee routine. The Foundation sees no reason for this codification. No other specific programs of the Foundation initiated at the direction of the Congress have been permanently codified. Moreover, authority for establishing such centers is now covered under the Science and Technology Equal Opportunities Act (42 U.S.C. §§1885-1885d), making this section redundant. Deletion of the section will simplify the law.

No increase in cost or personnel will result if the proposal is enacted.

Section 8 of NSF FY 1986-1987 Authorization Bill: Proposed Changes to Incorporate References to Engineering into the National Science Foundation Act of 1950 and Related Laws

The submitted bill would make a series of additions and modifications to the National Science Foundation Act of 1950, as amended, and related laws codified in Chapter 16 of Title 42 of the United States Code. The intent of these changes is to emphasize that the Foundation's mission includes support of engineering as well as science.

Except for a few minor additions and corrections*, subsections 8(a) and 8(b) are identical to title II of H.R. 5172 that was passed by both House and Senate in October 1984. Subsection 8(c) was added to conform the terminology of the Science and Technology Equal Opportunities Act (42 U.S.C. §§1885 to 1885d) to that incorporated into the National Science Foundation Act by subsection 8(a).

Two laws codified in Chapter 16 would not be changed. Title IX of the National Defense Education Act (42 U.S.C. §§1876 to 1879), relating to the establishment of a Science Information Council and Service, has been effectively repealed by the Federal Advisory Committee Act (5 U.S.C. App. I) and by a series of NSF program decisions that were ratified by successive authorization and appropriation Acts. The National Medal of Science Act (42 U.S.C. §§1880, 1881) requires no changes because a National Technology Medal was established by §12 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. §3711).

These amendments make no substantive change to the statutory mission or authority of the National Science Foundation. No increase in cost or personnel will result from their enactment.

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* These may be found in subsections 8(a)(1)(C), 8(a)(3)(A); 8(a)(13)(A), (B), and (C); and 8(a)(15)(C).

XII. BUDGET AS REQUESTED

National Science Foundation

Washington, D.C. 20550

FY 1986

Budget Summary

New Obligational Authority	
FY 1986 Budget Request	$1,569,399,722
FY 1985 Appropriation (P.L. 98-371)	1,501,792,000
Proposed Recission	-2,002,000
Proposed Deferral	-31,450,278
Proposed Supplemental Appropriation Request	750,000
FY 1985 New Obligational Authority	1,469,089,722
Increase in New Obligational Authority FY 1986/FY 1985	100,310,000
Program Level	
FY 1986:	
Appropriation	$1,569,399,722
Plus FY 1986 Deferral	31,450,278
FY 1986 Program Level	1,600,850,000
FY 1985:	
Appropriation	$1,501,792,000
Less Proposed Recission	-2,002,000
Less Proposed Deferral	-31,450,278
Plus Carryover	33,609,280
Plus Proposed Supplemental Appropriation Request	750,000
FY 1985 Program Level	1,502,699,002
Increase in Program Level FY 1986/1985	$98,150,998

NATIONAL SCIENCE FOUNDATION
FY 1986 BUDGET SUMMARY

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National Science Foundation

SUMMARY OF FY 1986 BUDGET BY APPROPRIATION AND PROGRAM

	Actual FY 1984	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
RESEARCH AND RELATED ACTIVITIES APPROPRIATION					
Mathematical and Physical Sciences	$355.046.031	$416.710.000	$396.622.000	$428.970.000	$32.348.000
Engineering	128.614.515	147.100.000	150.037.000	170.070.000	20.033.000
Biological Behavioral and Social Sciences	223.401.248	253.120.000	251.967.000	272.050.000	20.083.000
Astronomical Atmospheric Earth and Ocean Sciences	328.635.030	373.480.000	351.728.249	372.170.000	20.441.751
Scientific, Technological and International Affairs	36.211.148	46.900.300	44.460.000	38.360.000	-6.100.000
Advanced Scientific Computing	6.009.400	—0—	41.460.000	46.230.000	4.770.000
Program Development and Management	66.256.632	70.902.000	70.689.000	69.900.000	-789.000
Subtotal Obligations	1.144.174.004	1.308.212.000	1.306.963.249	1.397.750.000	90.786.751
Funding Reconciliation					
Unobligated Balance Available Start of Year	-704.680	—0—	-2.053.249	—0—	2.053.249
Proposed Recission	—0—	—0—	2.002.000	—0—	-2.002.00
Appropriation Transfer	—0—	—0—	-5.000.000	—0—	5.000.000
Unobligated Balance Available, End of Year	2.053.249	—0—	—0—	—0—	—0—
Adjustments to Prior Year Accounts	-3.563.893	—0—	—0—	—0—	—0—
Unobligated Balance Lapsing	301.320	—0—	—0—	—0—	—0—
Research and Related Activities Appropriation	1.142.260.000	1.308.212.000	1.301.912.000	1.397.750.000	95.838.000
U.S. ANTARCTIC PROGRAM ACTIVITIES					
U.S. Antarctic Research Program	10.432.804	11.000.000	11.000.000	11.500.000	500.000
Operations Support	91.954.900	104.080.000	99.898.296	108.600.000	8.701.704
Subtotal Obligations	102.387.704	115.080.000	110.898.296	120.100.000	9.201.704
Funding Reconciliation					
Unobligated Balance Available Start of Year	—0—	—0—	-68.296	—0—	68.296
Unobligated Balance Available, End of Year	68.296	—0—	—0—	—0—	—0—
U.S. Antarctic Program Activities Appropriation	102.456.000	115.080.000	110.830.000	120.100.000	9.270.000
SCIENCE AND ENGINEERING EDUCATION ACTIVITIES APPROPRIATION					
Research Career Development	20.311.329	21.000.000	27.300.000	27.300.000	—0—
College Science Instrumentation	—0—	—0—	5.000.000	5.000.000	—0—
Material Development and Research	23.432.567	27.700.000	22.700.000	22.700.000	—0—
Teacher Enhancement and Informal Science Education	11.890.402	25.000.000	25.000.000	25.000.000	—0—
Studies and Program Assessment	1.809.084	2.000.000	2.000.000	2.000.000	—0—
Subtotal Obligations	57.443.382	75.700.000	82.000.000	82.000.000	—0—
Funding Reconciliation					
Unobligated Balance Available Start of Year	13.913.430	—0—	-31.450.278	-31.450.278	31.450.278
Appropriation Transfer	—0—	—0—	5.000.000	—0—	-5.000.000
Unobligated Balance Available End of Year	31.450.278	—0—	31.450.278	—0—	—0—
Adjustments to Prior Year Accounts	59.887	—0—	—0—	—0—	—0—
Unobligated Balance Lapsing	79.857	—0—	—0—	—0—	—0—
Science and Engineering Education Activities Appropriation	75.000.000	75.700.000	87.000.000	50.549.722	-36.450.278
SPECIAL FOREIGN CURRENCY APPROPRIATION					
Special Foreign Currency	2.910.776	2.800.000	2.837.457	1.000.000	1.837.457
Subtotal Obligations	2.910.776	2.800.000	2.837.457	1.000.000	1.837.457
Funding Reconciliation					
Unobligated Balance Available Start of Year	-13.680	—0—	37.457	—0—	37.457
Unobligated Balance Available End of Year	37.457	—0—	—0—	—0—	—0—
Adjustments to Prior Year Accounts	79.453	—0—	—0—	—0—	—0—
Unobligated Balance Lapsing	44.900	—0—	—0—	—0—	—0—
Special Foreign Currency Appropriation	2.900.000	2.800.000	2.800.000	1.000.000	1.800.000
TOTAL NSF APPROPRIATIONS	$1.322.616.000	$1.501.792.000	$1.502.542.000	$1.569.399.722	$66.857.722

NSF FY 1986 BUDGET REQUEST

The National Science Foundation's FY 1986 Budget requests new obligational authority of $1,569.4 million and proposes a deferral of $31.5 million from FY 1985 into FY 1986. The total $1,600.9 million, is $98.2 million above the FY 1985 Current Plan of $1,502.7 million. It includes $1,397.8 million for Research and Related Activities of which $69.9 million is for Program Development and Management; $120.1 million for the U.S. Antarctic Program; $82.0 million for Science and Engineering Education and $1.0 million for Special Foreign Currency.

This Budget Request maintains support at current levels for research of proven quality across all disciplines; increases support for some specific programs and projects of particular current importance, and offsets these increases by reductions in, or termination of, programs of lower priority.

Specifically, this Budget Request:

- Increases support for research related to long term U.S. economic competitiveness.

  Support for Engineering Research Centers increases by $15.0 million above the FY 1985 level of $10.0 million. In FY 1985, NSF expects to start 5 to 10 such centers and a similar number in FY 1986. Research related to the emerging and economically important field of Biotechnology increases by $9.3 million above the FY 1985 level of approximately $70.0 million. Research on the Continental Lithosphere increases by $4.4 million above the FY 1985 level of $7.0 million. Other increases include Research on Advanced Materials ($3.2 million) and Engineering Design studies ($1.4 million).

- Increases support for programs that are key to the basic infrastructure of academic research.

  Access to Advanced Scientific Computing is increased by $4.8 million above the FY 1985 level of $41.5 million. This increase, together with other adjustments, will allow the establishment of an additional National Center in FY 1986, bringing the total to four. Support for research equipment and instrumentation is increased by $32.7 million above the FY 1985 base of $218.0 million exclusive of facilities. The proposed budget levels for Advanced Scientific Computing, Biotechnology, and Engineering Research Centers, include support for facilities where these are an integral part of the proposed program.

- Provides for leadership opportunities through quality programs in Science and Engineering Education.

  The program remains at the FY 1985 appropriation level of $82.0 million. The request proposes $50.5 million in new obligational authority and $31.5 million to be carried forward from FY 1985. The Foundation's Science and Engineering Education program is in a period of rebuilding and evaluation. This funding level, which is $24.6 million above FY 1984, will support the highest quality projects and allow the Foundation to build opportunities for strong future leverage. Together with the training component of other NSF research programs the Science and Engineering Education activity forms a major educational component of U.S. science and engineering.

- Enhances programs where NSF has major or unique responsibilities.

  These increases include support for mathematics (a $7.2 million increase above the FY 1985 level of $47.5 million) and Social and Economic Sciences (a $5.4 million increase above the FY 1985 level of $33.9 million).

- Continues major enhancements of research capabilities at a reduced rate due to budget constraints.

  These include the construction of the Very Long Baseline Array radio telescope ($11.5 million in FY 1986), the acquisition of an advanced computing system for the National Center for Atmospheric Research (NCAR) ($5.0 million in FY 1986), and capital improvements ($12.0 million in FY 1986) to the Cornell Electron Storage Ring.

- Offsets increases by combining related programs for greater efficiency and reducing or terminating support for lower priority programs.

  These reductions total $34.0 million distributed as follows: Mathematical and Physical Sciences--$6.3 million; Engineering--$8.0 million; Biological, Behavioral and Social Sciences--$6.6 million; Astronomical, Atmospheric, Earth and Ocean Sciences--$6.1 million; Scientific, Technologial and International Affairs--$7.0 million. Examples of programs that will be terminated include Alternate Biological Resources ($2.5 million in FY 1985), Ethics and Values in Science and Technology ($1.0 million), Productivity Improvement Research ($1.0 million) and Intergovernmental Science and Technology ($0.5 million). Other reductions involve decreasing or phasing out lower priority projects.

- Continues Presidential Young Investigator awards.

  The program will focus on younger faculty than in previous years (those less than four years beyond the Ph.D.). An additional $6.0 million will support one hundred new awards in FY 1986. This brings the total number of young investigators being supported to five hundred. The support is for five years and requires industrial sharing above a level of $25,000 per year. The maximum award is $100,000 per year.

- Reduces Program Development and Management.

  The request proposes $69.9 million, a reduction of $0.8 million from FY 1985. This is based on the Foundation's resolve to maximize support for research and education and to reduce internal administrative costs in line with the Administration's plan to reduce operating expenses including a 5 percent pay cut. This will support 1,174 FTE's, 20 fewer than authorized in FY 1985.

Several organizational changes are proposed to ensure optimum use of Foundation resources and to increase the effectiveness of programs. Specifically:

- The Engineering activity is reorganized to enable the Foundation to take greater advantage of the engineering research capabilities of universities, to strengthen the links between universities and industry, and to focus on emerging and critical problems in engineering research. In addition, the Industry/University Cooperative Research Projects and Centers programs ($10.0 million) are transferred from the Scientific, Technological and International Affairs activity to Engineering.

- To enhance coupling to core research programs, support in FY 1986 for Minority Research Initiation (MRI) ($2.5 million), Research Opportunities for Women (ROW) ($1.0 million), and the Experimental Program to Stimulate Competitive Research (EPSCOR) ($2.0 million) is distributed to disciplinary activities. The FY 1986 support for Research Opportunities for Women and the Experimental Program to Stimulate Competitive Research is double the FY 1985 level. The responsibility for management and coordination of these programs will remain with STIA.

- Support for international cooperative research specifically related to bilateral agreements ($9.7 million) is consolidated in STIA. Close coordination between STIA and the disciplinary activities will continue for both the management of these programs and the development of other international programs supported by the disciplinary activities.

STRATEGY FOR FY 1986

In formulating program and budget priorities for FY 1986, several important considerations guided the Foundation's allocations. Within the available resources, high priority is given to:

- Educating and attracting scientists and engineers necessary for the Nation's future science and technology base through:

  - Fellowships open to all disciplines.
  - Special programs addressing the underrepresentation of minorities, women, and the physically handicapped in science and engineering.
  - Programs that encourage young faculty in disciplines where faculty shortages are severe.
  - Programs addressing precollege science and mathematics education.
  - Support of graduate students through research projects in all fields of science and engineering.

- Continuing the emphasis on research instrumentation through programs to replace worn-out or obsolete instrumentation, to acquire sophisticated new instruments necessary to pursue experimental research in many forefront areas, and, in special cases, to provide support for new or modified laboratory space. This is an essential element in the Foundation's efforts to revitalize the academic research base.
- Maintaining an appropriate balance of support between research fields and among large projects, coordinated research activities, and individual investigator projects.
- Leveraging federal funds with private sector, state, and academic funds in all areas where cooperation is a possibility and in the best interest of all participants.

There is increasing recognition of the importance of science and engineering research to the future of the Nation, that research activities are long term investments and that continuity over an extended period of time is very important. Given the constrained budget environment for FY 1986, the Foundation must make difficult choices in order to minimize the impact on academic science and engineering research activities. These include:

- Reducing NSF's administrative costs further. They are already low compared to those of similar organizations.
- Curtailing programs that are not in the mainstream of science and engineering research and education.
- Enhancing, but at a slower rate than originally planned, several major activities started in earlier years (Engineering Research Centers, Access to Advanced Scientific Computing, and Research on the Continental Lithosphere).

- Stretching out construction and acquisition of several major research projects including the Very Long Baseline Array (VLBA) radio telescope.
- Making trade-offs with ongoing base programs in order to provide for enhancements in several key areas where research is essential to the Nation's pursuit of scientific and technological advances, and, importantly, to training the next generation of scientists and engineers.

HIGHLIGHTS OF THE NSF FY 1986 REQUEST BY ACTIVITY

MATHEMATICAL AND PHYSICAL SCIENCES (MPS)

The FY 1986 Budget Request for MPS is $429.0 million. This represents an increase of $32.4 million, or 8.2 percent, over the FY 1985 Current Plan. Mathematical Sciences increases by $7.2 million to $54.7 million, Computer Research increases by $2.6 million to $41.7 million; Physics increases by $7.8 million to $123.4 million; Chemistry increases by $6.1 million to $93.5 million; and Materials Research increases by $8.6 million to $115.7 million.

These increases affect the major components of all programs as follows:

Research Project Support -- Support for scientific research projects (SRPS) is increased by $24.2 million, or 8.2 percent, to a total of $288.7 million. Included in that amount is instrumentation totalling $35.6 million.

- In Mathematical Sciences, continued improvement is made in the support of graduate students and young investigators on research project awards in accordance with the recommendations of the 1984 report from the National Research Council entitled, Renewing U.S. Mathematics: Critical Resource for the Future.
- In Computer Research, emphasis will be given to project support, particularly in theoretical areas. Project support has been held nearly constant for several years while experimental computer science capabilities were built up through the Coordinated Experimental Research program.
- In Physics, ensuring adequate support for the best research projects in the various subfields reduces the number of senior investigators supported. Included are university-based user groups in elementary particle physics and nuclear sciences, as well as other SRPS projects in atomic, molecular, and plasma physics, theory, and gravitational physics. An amount of $1.0 million is included to continue planning studies for a full-scale laser interferometer for gravitational wave detection.

- In Chemistry, increased support is provided for innovative projects that result from the research thrusts in materials chemistry and the chemistry of life processes, both initiated in FY 1985. In other areas, support for high priority programs is maintained by the selective termination of research projects that are less competitive. The number of senior investigators supported remains at approximately 875 in order to maintain average grant size at the FY 1985 level.

- In Materials Research, enhanced support is provided for the collaborative group research program, interdisciplinary research on materials chemistry, and research on novel materials. In other areas, support for high priority projects is maintained by reducing support for lower priority activities. The number of senior investigators supported is decreased somewhat to provide necessary support for instrumentation, materials and supplies, and graduate students and postdoctoral researchers.

Special Equipment Programs -- Mathematical Sciences, Computer Research, Chemistry, and Materials Research provide support through formal or informal programs for the acquisition of research instrumentation and equipment intermediate in cost between that normally provided in research project awards and that available at major laboratories and national user facilities. This type of instrumentation is generally for group or departmental use and represents an effective way of sharing experimental capabilities. Support for special equipment programs is increased by $1.8 million, or 9.3 percent, to a total of $21.2 million.

University Laboratories -- Support for research, operations, and instrumentation at university laboratories in Computer Research, Physics, and Materials Research is increased by $1.7 million, or 2.8 percent, to a total of $63.5 million. Within this total, the amount included for instrumentation is $21.7 million. Included are the experimental computer research facilities, the electron accelerator at the University of Illinois, a number of nuclear physics laboratories, the Joint Institute for Laboratory Astrophysics at the University of Colorado, and the Materials Research Laboratories.

National User Facilities -- Support for national user facilities is increased by $4.7 million, or 9.2 percent, to a total of $55.6 million. Within this total, the amount included for instrumentation is $22.7 million. These facilities include the Mathematical Sciences and the Theoretical Physics Institutes, the Cornell Electron Storage Ring, the Indiana University Cyclotron Facility, the Michigan State University Superconducting Cyclotron, the Synchrotron Radiation Facilities at Cornell University and the University of Wisconsin, the Center for High-Resolution Electron Miscroscopy at Arizona State University, the Small Angle Scattering Facility, and the National Magnet Laboratory.

The MPS total for all categories of research equipment is increased by $11.4 million, or 15.1 percent, to a total of $102.1 million. This represents an increase in the fraction of the total budget devoted to research instrumentation and equipment from 22.3 percent to 23.8 percent.

ENGINEERING (ENG)

The President's Science Advisor, the Congress, the National Academy of Engineering, and the National Science Foundation and Board have been increasingly concerned about the need to maintain industrial competitiveness and to strengthen engineering research and education in the United States at a time when engineering is undergoing fundamental changes.

As part of its mission to ensure the health of research and education in science and engineering, the National Science Foundation intends to give the United States important added research capacity to maintain its leadership in engineering over the long term via a strategy that includes: a reorganization of the Engineering Directorate to address engineering research and education goals more effectively; developing closer links between universities and industry needs over the long term through Engineering Research Centers and Industry/University Cooperative Research Projects and Centers; and a budget request for FY 1986 that includes increases for emerging fields of engineering research. This request is coupled with an effort to leverage the activity by requiring industry participation and support.

The FY 1986 Budget Request for Engineering is $170.1 million. This represents an increase of $20.0 million, or 13.3 percent, over the FY 1985 Current Plan of $150.1 million. Support is included for an additional 50 Presidential Young Investigators in engineering bringing the total to 250. Having achieved this level of support for young engineers, the Foundation is proposing to terminate the Research Initiation Grant Programs. The FY 1986 Request provides balanced support for established and emerging fields of engineering research, including further development of Engineering Research Centers, as follows:

Research Project Support in Established Fields of Engineering -- Support for research projects in established major fields of Engineering is increased by $1.9 million, or 2.5 percent to a total of $79.7 million. Specifically:

- Chemical, Biochemical and Thermal Engineering remains at the FY 1985 level of $29.4 million. Support is increased in several research areas including kinetics and catalysis, separation and purification processes, and thermodynamics and transport phenomena. Activities will be curtailed in nucleonics, energy conversion, and non-solid multiphase flow.

- Mechanics, Structures and Materials Engineering is increased by $0.6 million to a total of $23.7 million. Support is increased in several research areas including solid mechanics, fluid dynamics and hydraulics, tribology, dynamical systems and control, and materials engineering and processing. Activities will be curtailed in selected areas of geotechnical engineering and structural mechanics.

- Electrical, Communications and Systems Engineering is increased by $1.3 million to a total of $26.7 million. Support is increased in several areas including solid state and microstructures, systems theory and operations research, and instrumentation, sensing and measurement. Activities will be curtailed in theoretical electromagnetics, two-dimensional imaging, and one-dimensional digital signal processing.

Research Project Support in Emerging Fields of Engineering -- Support for research projects in important emerging areas such as design methodology and systems integration, automation, manufacturing systems, and emerging technologies such as biotechnology is increased by $6.6 million or 12.6 percent to a total of $58.9 million. Specifically:

- Design, Manufacturing and Computer Engineering is increased by $3.2 million to a total of $20.4 million. Research areas receiving increased support include computer-integrated design and manufacturing, computer research and design theory and methodology applicable to all fields of engineering.

- Emerging and Critical Engineering Systems is increased by $3.4 million to a total of $38.5 million. Research areas receiving increased support include biotechnology, bioengineering and research to aid the handicapped, lightwave technology; environmental engineering, systems engineering for large structures, and natural and man-made hazard mitigation. Societal response research in the Earthquake Hazard Mitigation program will be curtailed.

Cross-Disciplinary Research -- Support for Engineering Research Centers and Industry/University Cooperative Centers and Projects is increased by $11.5 million or 57.6 percent to a total of $31.5 million:

- Engineering Research Centers is increased by $15.0 million to a total of $25.0 million. The program continues to emphasize experimental capabilities not available to individual investigators; opportunities for cross-disciplinary teams to focus on areas of research such as engineering systems in manufacturing, materials processing, and communications; training students to synthesize, integrate, and manage engineering systems; interaction between industry and universities.

- Industry/University Cooperative Research Centers remains at the FY 1985 level of $3.0 million and continues to foster university/industry interactions by supporting basic and applied research at university centers in fields of industrially relevant science and technology. In contrast to the Engineering Research Centers, where the emphasis is on a strong education effort associated with a research program that has a long-term commitment of NSF support, the purpose of this program is to initiate centers that can obtain sufficient industry, state, and other public sector support to become self sustaining after the initial grant period.

- Industry/University Cooperative Research Projects is reduced by $3.5 million from the FY 1985 level of $7.0 million to $3.5 million. Approximately the same number of projects will be supported in FY 1986 as were in FY 1985 and the total support from this program and other disciplinary activities will remain at the FY 1985 level of $14.0 million. The portion of the total funds provided by this program will be reduced from 50 to 25 percent.

BIOLOGICAL, BEHAVIORAL, AND SOCIAL SCIENCES (BBS)

The FY 1986 Budget Request for BBS of $272.1 million is an increase of $20.1 million, or 8.0 percent over the FY 1985 Current Plan. The request will permit continued progress towards the goals of increasing knowledge about life forms and life and social processes through research on biological and social phenomena. Part of the increase will be used to strengthen support for promising areas of fundamental research related to biotechnology. Within the activity:

- Molecular Biosciences is increased by $3.2 million to a total of $64.1 million. Areas of emphasis will be molecular plant biology, multidisciplinary projects in chemistry and biology of life processes, and research using innovative genetic approaches and acquisition of large equipment for shared use by investigators. Research in biophysics, biochemistry, prokaryotic genetics, and metabolic biology will continue to characterize much of the subactivity.

- Cellular Biosciences is increased by $3.5 million to a total of $54.4 million. The increase will permit continued emphasis in plant biology, the use of genetic and immunological techniques as research tools, and support of research instrumentation. Support will be provided for interdisciplinary research by biologists and chemists, and for retraining scientists in contemporary research technologies. The research disciplines encompassed by the proposed funding are cell biology, cellular physiology, developmental biology, eukaryotic genetics, and regulatory biology.

- Biotic Systems and Resources is increased by $4.6 million to a total of $63.0 million. The increase will be used to support young investigators for research in plant biology and for refurbishing field laboratories, including terrestrial laboratories. Research in the ecological sciences and in systematic and population biology will continue to analyze ecological relationships, factors affecting biological productivity, and processes basic to the development of biological diversity.

- Behavioral and Neural Sciences is increased by $2.8 million to a total of $47.1 million, with most of the growth in neurosciences, where powerful new techniques permit progress in understanding nervous system development. Cognitive science will maintain its emphasis on the learning process, and anthropology will continue to stress research into human origins and development of artifact dating techniques.

- Social and Economic Science is increased by $5.4 million to a total of $33.9 million. Support will increase for economic research including research of the type previously supported under the auspices of other Federal activities, for current data base development, methodological research, and for instrumentation for the analysis of large scale data bases. Basic research initiatives in social measurement and analysis and in governance and decision processes will be maintained.

- Information Science and Technology is increased by $0.6 million from $8.9 million to $9.5 million. The program will increase support levels in information technology and information impact. Emphasis remains on improving understanding about the way information is structured, represented, manipulated and used, on improving the interaction of human users and information processing systems, and on understanding the effects of information and information technologies on economic and social processes.

ASTRONOMICAL, ATMOSPHERIC, EARTH, AND OCEAN SCIENCES (AAEO)

The FY 1986 Budget Request for AAEO is $372.2 million, an increase of $20.4 million or 5.8 percent over the FY 1985 Current Plan of $351.7 million. The changes in individual subactivities are as follows:

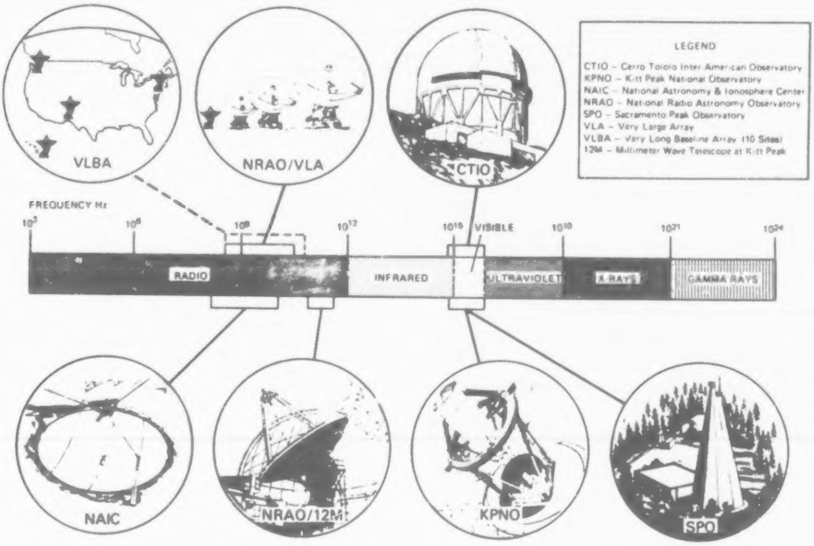
- Astronomical Sciences is increased by $5.6 million to a total of $88.7 million. This increase will be targeted on highest priority activities recommended in the report of the Astronomy Survey Committee of the National Academy of Sciences. Included is continuing support for the acquisition of the Very Long Baseline Array (VLBA) radio telescope, a project singled out by the report as being of high priority.

- Atmospheric Sciences is increased by $3.4 million to a total of $97.6 million. The major increase will be for instrumentation and research equipment acquisition and increased research costs. Funding to continue the acquisition of an advanced computer system at the National Center for Atmospheric Research will be the same as planned for FY 1985, $5.0 million. The Global Atmospheric Research Program, now well into the data analysis phase, continues to phase down.

- Earth Sciences is increased by $5.6 million to a total of $51.5 million, which allows for increased continental reflection profiling operations, major upgrading of instrumentation, and a major research thrust on the chemistry, structure, and geologic history of the continental lithosphere. The continental lithosphere thrust will include continuation of site surveys for possible future deep continental drilling, development of seismograph arrays to map the structure of the earth's crust and underlying mantle, use of the satellite global positioning system to make precise geodetic measurements, and studies of the physics and chemistry of geological materials to aid in interpretations of geophysical data.

- Ocean Sciences is increased by $4.9 million to a total of $125.6 million, with emphasis on global ocean studies. Increased instrumentation support will be provided through project grants. Maintenance and upgrading of shipboard scientific equipment also are priorities. The Ocean Drilling Program will be fully operational.
- Arctic Research is increased by $0.9 million to a total of $8.8 million, which offsets inflationary increases in project support and provides funding for the Arctic Research Commission and the Interagency Arctic Research Policy Committee.

SPECTRUM COVERAGE OF TELESCOPES AT NATIONAL ASTRONOMY CENTERS


VLBA
NRAO/VLA
CTIO
LEGEND
CTIO – Cerro Tololo Inter American Observatory
KPNO – Kitt Peak National Observatory
NAIC – National Astronomy & Ionosphere Center
NRAO – National Radio Astronomy Observatory
SPO – Sacramento Peak Observatory
VLA – Very Large Array
VLBA – Very Long Baseline Array (10 Sites)
12M – Millimeter Wave Telescope at Kitt Peak
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GAMMA RAYS
NAIC
NRAO/12M
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SPO

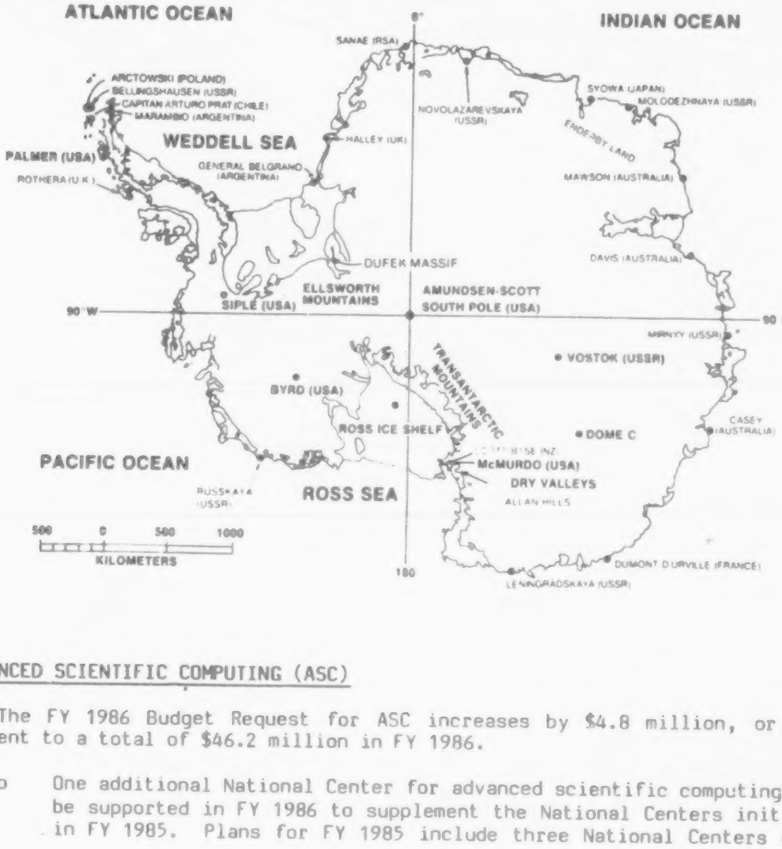
U.S. ANTARCTIC PROGRAM (USAP)

The FY 1986 Budget Request for USAP increases 8.3 percent over the FY 1985 Current Plan. The increase of $9.2 million from $110.9 million to $120.1 million is required for the following expenses:

- The major amount, $5.0 million, is for the continuation of major maintenance and upgrading of two older LC-130 aircraft. This aircraft rework, which was formerly called Service Life Extension Program or SLEP, is now underway using funds approved in FY 1984.

- The remaining $4.2 million will be used to offset a general increase in costs and the charter of a specially equipped ship of the Academic Fleet to conduct a marine seismic survey in the southern oceans. The increased ship charter costs are about $0.8 million, leaving $2.9 million for other operations cost increases and $0.5 million for research grant cost increases.

ANTARCTICA: selected stations and physical features.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MARAMBIO (ARGENTINA)
WEDDELL SEA
HALLEY (UK)
NOVOLAZAREVSKAYA (USSR)
SYOWA (JAPAN)
MOLODEZHNAYA (USSR)
ENDERBY LAND
PALMER (USA)
ROTHERA (U.K.)
GENERAL BELGRANO (ARGENTINA)
MAWSON (AUSTRALIA)
DUFEK MASSIF
DAVIS (AUSTRALIA)
ELLSWORTH MOUNTAINS
SIPLE (USA)
AMUNDSEN-SCOTT SOUTH POLE (USA)
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TRANSANTARCTIC MOUNTAINS
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CASEY (AUSTRALIA)
SCOTT BASE (NZ)
McMURDO (USA)
DRY VALLEYS
ALLAN HILLS
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LENINGRADSKAYA (USSR)

ADVANCED SCIENTIFIC COMPUTING (ASC)

The FY 1986 Budget Request for ASC increases by $4.8 million, or 11.5 percent to a total of $46.2 million in FY 1986.

- One additional National Center for advanced scientific computing will be supported in FY 1986 to supplement the National Centers initiated in FY 1985. Plans for FY 1985 include three National Centers using proven supercomputer systems and an additional center using an experimental system. Also, supercomputer time will continue to be purchased as necessary from the Interim Centers, which have provided supercomputer time in FY 1984 and FY 1985.

- Work to improve networks necessary to provide ready access to the centers will continue as will software improvement. Funding from this activity for local equipment needs will be reduced, as funds for such equipment are increased in the disciplinary programs. Scientific use of experimental computing systems not commercially available will be emphasized.

SCIENTIFIC, TECHNOLOGICAL, AND INTERNATIONAL AFFAIRS (STIA)

The Scientific, Technological, and International Affairs activity carries out essential Foundation responsibilities that cut across scientific disciplines. The FY 1986 Budget Request of $38.4 million is a net decrease of $6.1 million or 13.8 percent less than the FY 1985 Current Plan of $44.5 million. Several programs have been transferred to the disciplinary activities to improve their effectiveness and future impact. These transfers include the incorporation of the Industry/University Cooperative Research Projects and Centers program elements in the Engineering activity and the inclusion of the funding for Research Opportunities for Women, the Minority Research Initiation, and the Experimental Program to Stimulate Competitive Research program elements in discipline-oriented research activities of the Foundation.

Several other programs of lower priority in a period of constrained budgets -- Productivity Improvement Research, Ethics and Values in Science and Technology, and Intergovernmental Science and Technology -- will be terminated. Researchers formerly supported through these programs will be able to compete for support in other NSF programs, for example in Social and Economic Science. Within STIA:

- Industrial Science and Technological Innovation (ISTI) decreases from $13.4 million to $13.3 million. The Small Business Innovation Research (SBIR) program element is increased by $0.9 million (from $12.4 million to $13.3 million) and maintains a total program equal to one percent of the Foundation's research budget. The program will continue to support high quality research proposals from science- and high-technology-based small business firms on important scientific and engineering problems and opportunities that could lead to significant public benefit if the research is successful.

- International Cooperative Scientific Activities decreases from $13.6 million in FY 1985 to $12.1 million. This amount will provide support for U.S. participation in cooperative research projects, seminars, workshops, and short-term scientific visits abroad, at a level slightly less than in FY 1985. About 1,300 U.S. scientists, 100 fewer than in FY 1985, are expected to participate in these joint activities. It will allow for continued coordination and management of NSF's responsibilities under bilateral agreements.

This subactivity will continue to support cooperative projects under the Indo-U.S. Science and Technology Initiative at a level of $1.7 million, $300,000 less than FY 1985. Special emphasis will be maintained in FY 1986 on programs in China, Eastern Europe, Western Europe, Sub-Saharan Africa, and Latin America as well as continuation of U.S. participation in international scientific organizations.

o Policy Research and Analysis decreases by $2.7 million to a total of $2.0 million in FY 1986. In a period of constrained budgets, this effort will focus on only the highest priority activities, such as S&T policy related questions raised by the National Science Foundation and other Executive agencies.

o Science Resources Studies decreases by $0.3 million to a total of $4.0 million in FY 1986. This level is sufficient to maintain the existing science resources data base and continue the ongoing programs of regular periodic surveys. Support will continue for recently initiated efforts to develop more current and accurate indicators of S&T resources and activities in selected major industrial countries.

o Research Initiation and Improvement decreases by $1.5 million to a total of $7.0 million in FY 1986. Program elements to be funded entirely by discipline-oriented research activities will increase by a net amount of $3.5 million over the $48.4 million level provided in FY 1985. The increase will go to: Support for Predominantly Undergraduate Institutions -- $2.0 million (from $42.4 million to $44.4 million); Research Opportunities for Women -- $0.5 million (from $0.5 million to $1.0 million); Experimental Program to Stimulate Competitive Research -- $1.0 million (from $1.0 million to $2.0 million). Other programs in this subactivity -- Visiting Professorships for Women and Research Improvement in Minority Institutions will remain at essentially their FY 1985 level.

SCIENCE AND ENGINEERING EDUCATION (SEE)

The FY 1986 program total for SEE is $82.0 million. This total includes an FY 1986 Request for new obligational authority of $50.5 million and deferral of $31.5 million from FY 1985. The FY 1986 Program total remains the same as the FY 1985 appropriation of $82.0 million. The FY 1985 deferral of $31.5 million is the same as the amount carried over from FY 1984 into FY 1985.

The problems facing the Nation's schools are well known, due in large part to the publicity given to numerous national commission reports that have appeared in the last few years. Many activities directed at solving these problems are now underway throughout the country. Despite increased efforts at the state and local levels and increased private sector support, there remains a need for national-level leadership activities carefully structured to provide support at minimal but critical levels to catalyze a range of improvement efforts.

Although SEE has a responsibility and concern for all levels of science and engineering education, the program is currently targeting for special emphasis the science and mathematics taught in the middle and elementary grades of the Nation's schools.

There is a need for communication networks among the activities now underway and those to be developed. NSF's programs have been designed to satisfy these needs, capitalizing on its unique position to lead this effort. This unique position is derived from NSF's extensive interactions with practicing scientists and engineers and with educational and professional institutions and societies.

NSF will continue to support graduate fellowships in the sciences and engineering, significant improvements at the high school level, and limited, but high-leverage, activities at the undergraduate level.

In FY 1986, support will be provided for:

- Research Career Development ($27.3 million). The activity funds NSF Graduate Research Fellowships to recognize and support the Nation's most talented graduate students and prepare them to enter the science and engineering work force, with specific attention given to the participation of minorities.
- College Science Instrumentation ($5.0 million). This program supports efforts to strengthen the laboratories and curricula in undergraduate science instruction at the Nation's four-year colleges.
- Materials Development and Research ($22.7 million). This program supports projects to enable scientists and science educators to develop instructional materials for students and for teacher training, to better understand the processes of teaching and learning, and to study and develop future applications of advanced technologies.
- Teacher Enhancement and Informal Science Education ($25.0 million). This effort supports local and regional projects for continuing education and professional development for precollege mathematics and science teachers, programs of informal science education through museums and the media, and dissemination activities to bring teachers information on new programs and materials.

- Studies and Program Assessment ($2.0 million). Through this program the Foundation will institute studies and analyses to provide a systematic and current understanding of the condition of science and mathematics education in the United States.

The building of partnerships and communication networks is a central element in NSF's Science and Engineering Education plan for FY 1986 and the future. This and other aspects of the program are consistent with the goals and purposes of P.L. 98-377, the Education for Economic Security Act.

PROGRAM DEVELOPMENT AND MANAGEMENT (PD&M)

The PD&M estimate of $69.9 million is a net reduction of $0.8 million from the FY 1985 Current Plan. If, as in previous years, the FY 1986 estimate level had included funding for the full impact of anticipated inflation, full annualization of the Federal pay increase effective January 1985, announced postage rate increases, and expected telephone rate increases, the minimum requirement would be about $73.5 million. The $69.9 million estimate is based on NSF's resolution to maximize support for research and education and to minimize administrative costs. This reflects administration policies to reduce operating expenses, including a reduction of 20 FTEs, and a proposal to reduce all salary levels by five percent, effective January 1, 1986.

The estimate provides funding for 1,174 authorized full-time equivalent employment. Travel funds are held at about the FY 1985 level, while certain other costs categories have been increased to lease more efficient telephone equipment, which will have the longer-term effect of reducing communication costs, and purchase ADP equipment to achieve efficiencies in management and administrative operations. Funds are also included to continue space rennovations to conform with current General Services Administration space utilization regulations and thereby reduce future rental costs.

HIGHLIGHTS OF MULTI-ACTIVITY PROGRAMS

1. SCIENCE AND ENGINEERING TRAINING AND EDUCATION

Education at all levels in the United States is fundamentally a widely dispersed enterprise, conducted mostly through the efforts of locally autonomous schools, colleges, and universities. Funding from the National Science Foundation represents only a small fraction of the total national support for science and engineering education. Nevertheless, NSF funding is designed to gain maximum leverage and serve as a catalyst for achieving improvements and for strengthening the Nation's base of high quality scientific and engineering personnel.

NSF activities capitalize on the links of NSF to the academic community and stress the appropriate participation of highly qualified scientists and engineers. Emphasis is placed on team efforts that include scientists, engineers, educators, active teachers, and where appropriate, officials of state and local educational agencies, and the private sector.

It is vitally important that the Nation continue to invest in the maintenance of a strong base of science and engineering education. Such an investment will be a significant factor in:

- Stimulating and improving the Nation's economic growth and productivity;
- Providing a well-trained human resource pool essential to future technological breakthroughs of benefit to society;
- Maintaining U.S. leadership in science and technology and improving the Nation's competitive position in international trade; and
- Strengthening U.S. national security.

The Foundation's FY 1986 Budget Request assists in addressing the needs in science and engineering education and in the training of young scientists and engineers. Responsibilities for these efforts involve both the Foundation's Science and Engineering Education activity and its disciplinary research activities.

At the Precollege Level

The Foundation's Science and Engineering Education (SEE) activity will place special emphasis on the science and mathematics programs in the Nation's elementary and junior high schools. Strong evidence suggests that not only are these educational levels crucial to the ultimate outcomes of education, but that the problems involved in learning and motivation in mathematics and science are the most complex at these levels. At the same time, support will continue for promising programs at the high school level.

The FY 1986 program is designed to assist in providing the highest quality precollege science and mathematics education activities for America's youth. These activities will enable scientists and educators to develop new or improved instructional materials for students and teachers; provide for research and development on the application of advanced technologies, particularly the computer, to the teaching and learning of science and mathematics; support local and regional programs of continuing education and professional development for teachers; and provide for annual recognition of outstanding secondary school teachers through the Presidential Awards for Excellence in Science and Mathematics Teaching.

The program will support informal science education activities to improve understanding and awareness of science using a variety of media, including radio, television, and museums. Activities designed to publicize and disseminate information about highly successful programs and outstanding research in science and engineering education will be supported.

Program funds will also provide for studies and analyses of existing data bases to provide a systematic and current understanding of the condition of precollege science and mathematics education in the United States.

At the Undergraduate Level

Research awards to doctoral granting institutions will provide opportunities for about 3,000 undergraduate research participants. The Engineering Research Centers program will also provide important opportunities for the training of undergraduate engineering students.

The College Science Instrumentation program will provide matching funds of $5.0 million for the acquisition of modern instrumentation at the Nation's 4-year colleges to improve their capabilities in science and engineering instruction. In addition, support for faculty research at predominantly undergraduate institutions (institutions awarding 20 or fewer Ph.D.'s in science and engineering over the past two years) is estimated to increase from $42.4 million in FY 1985 to $44.4 million in FY 1986 or by 4.7 percent. This amount comprises support for research proposals submitted directly to disciplinary research programs; proposals submitted through the Research in Undergraduate Institutions (RUI) program, which increases from $7.6 million in FY 1985 to $8.0 million in FY 1986; and for Research Opportunity Awards (ROA), that provide for faculty at small colleges to participate in research projects at large institutions. Support under these activities will provide for a stronger coupling between research and education in the Nation's predominantly undergraduate institutions. It will provide greater opportunities for faculty and students at these institutions to gain hands-on experience with the latest scientific instrumentation and research techniques.

At the Graduate Level

Support for graduate students on research awards increases from $102.1 million in FY 1985 to $110.9 million in FY 1986 or by 8.6 percent. This will provide support for an additional 445 graduate students bringing the total to about 11,140. These graduate research assistants are selected by faculty principal investigators and carry out significant research tasks while at the same time gaining valuable learning experiences that help prepare them for future careers in science and engineering. The Engineering Research Centers, in particular, will help train graduate students to gain better understanding of modern engineering practice.

Support for NSF Graduate Research Fellowships is continued at the FY 1985 level of $27.3 million. The recipients of NSF graduate fellowships are highly talented U.S. citizens who are selected through a national competition on the basis of merit. In FY 1986, the Foundation will make 560 new fellowship awards, bringing the total number of graduate fellows supported to approximately 1,500. The stipend remains at the FY 1985 level of $11,100 per year, and the yearly cost-of-education allowance remains at $6,000.

SUPPORT OF GRADUATE STUDENTS ON RESEARCH PROJECTS

(Dollars in Millions)

	Number Supported				*Amount of Support*			
	Actual FY 1984	*Estimate FY 1985*	*Estimate FY 1986*	*% Diff. FY 86/85*	*Actual FY 1984*	*Estimate FY 1985*	*Estimate FY 1986*	*% Diff. FY 86/85*
Research & Related Activities								
Mathematical & Physical Sciences ...	4,354	4,587	4,753	3.6%	$37.3	$42.1	$45.8	8.8%
Engineering	1,902	2,127	2,325	3.5	22.7	25.8	28.6	10.9
Biological, Behavioral & Social Sciences ...	1,830	1,985	2,054	3.5	13.3	15.1	16.0	6.0
Astronomical, Atmospheric, Earth & Ocean Sciences ...	1,657	1,685	1,735	3.0	16.5	16.4	17.8	8.5
Scientific, Technological, & International Affairs	139	152	90	-40.8	1.0	1.3	0.9	-30.8
Advanced Scientific Computing	0	60	100	66.7	0.0	0.7	1.2	71.4
U.S. Antarctic Program	69	73	76	4.1	0.6	0.6	0.6	0.0
Special Foreign Currency	30	29	10	-65.5	0.1	0.1	.03	-70.0
TOTAL, NSF	**9,981**	**10,698**	**11,143**	**4.2%**	**$91.5**	**$102.1**	**$110.93**	**8.6%**

At the Postdoctoral Level

Support for postdoctoral researchers increases from $57.1 million in FY 1985 to $61.2 million in FY 1986 or by 7.2 percent. The number of postdoctorals supported increases from 3,132 to 3,253 or by 3.9 percent.

SUPPORT OF POSTDOCTORALS ON RESEARCH PROJECTS

(Dollars in Millions)

	Number Supported				Amount of Support			
	Actual FY 1984	*Estimate FY 1985*	*Estimate FY 1986*	*% Diff. FY 86/85*	*Actual FY 1984*	*Estimate FY 1985*	*Estimate FY 1986*	*% Diff. FY 86/85*
Research & Related Activities:								
Mathematical & Physical Sciences ...	1,443	1,523	1,581	3.8%	$27.10	$30.10	$32.40	7.6%
Engineering	201	227	269	18.5	2.50	2.90	3.40	17.2
Biological, Behavioral & Social Sciences ...	807	858	871	1.5	13.70	15.10	16.00	6.0
Astronomical, Atmospheric, Earth & Ocean Sciences ...	420	452	465	2.9	7.10	7.80	8.30	6.4
Scientific, Technological, & International Affairs	41	46	40	-13.0	0.59	0.73	0.68	-6.8
Advanced Scientific Computing	0	8	8	0.0	0.00	0.20	0.20	0.0
U.S. Antarctic Program	17	18	19	5.6	0.21	0.23	0.24	4.3
TOTAL, NSF	**2,929**	**3,132**	**3,253**	**3.9%**	**$51.20**	**$57.06**	**$61.22**	**7.3%**

Presidential Young Investigators

The Presidential Young Investigators Research Awards, initiated in FY 1984, provide research support for the Nation's most promising young science and engineering faculty members. The awards, which generally combine Foundation and industrial support, are intended to encourage promising young scientists and engineers, those within four years of the Ph.D., to select and remain in academic careers. This will help ensure the excellence of the Nation's science and engineering education, training, and research.

In FY 1986, NSF will support 500 Presidential Young Investigator awards, including 100 new awards and 400 ongoing awards initiated in FY 1984 and FY 1985, at a level of $29.8 million. About half of the new awards will be made to young engineering faculty, where there is an identified continuing shortage.

2. INTERNATIONAL SCIENCE AND ENGINEERING

The main purpose of the Foundation's international activities is to strengthen the U.S. research effort in science and engineering. The immediate benefits of the activities to the United States result from sharing the costs of large research installations; access to special facilities, instruments, environments, and expertise located abroad; access to foreign research materials and to sites for observing natural and social phenomena; and sharing of effort upon and immediate benefits from regional and global research on the environment. Moreover, cooperative science and engineering programs often serve to support and strengthen U.S. foreign policy objectives. The success of U.S. scientific and engineering research and the maintenance of the Nation's well-being have become increasingly dependent on international cooperation.

One Foundation grant out of every five contains some form of international implication. Activities supported may range from travel by U.S. scientists to attend scientific meetings held abroad, through research projects conducted abroad, to taking part in major global programs in specific disciplines, for example, in the atmospheric and ocean sciences.

The Scientific, Technological and International Affairs activity manages most of NSF's formal international cooperative research through programs with some 30 countries for bilateral cooperation across a wide range of disciplines. STIA also manages NSF participation in such Administration initiatives as the Indo-U.S. Science and Technology Initiative. It provides support to the National Academy of Sciences for cooperation with sister academies in China and Eastern Europe, and support for U.S. participation in the International Council of Scientific Unions. STIA also manages the Special Foreign Currency Budget Activity.

However, STIA directly manages only a portion of the Foundation's total international activities as is evident from the table below. THe discipline-oriented research activities provide support for two major international cooperative activities, Antarctic Research and Ocean Drilling, and in the normal activity of supporting scientific research projects, fund about 700 projects for approximately $80.0 million that have some form of international implication. In addition, the discipline-oriented research activities actively participate in the review and oversight of projects supported by the STIA Activity. An interdirectorate steering group meets regularly to provide a forum for policy and management issues affecting international science and engineering activities in all parts of the Foundation. The discipline-oriented activities are instrumental in establishing the research agendas of the bilateral agreements.

The following table shows NSF support for international activities in terms of cooperative research carried out under formal bilateral or multilateral agreements; research projects that are intrinsically international; and special activities, including support for international institutions, that are sufficiently large to be identified individually.

NSF SUPPORT OF INTERNATIONAL SCIENCE ACTIVITIES
(Millions of Dollars)

	Actual FY 1984	*Current Plan FY1985*	*Estimate FY 1986*	*Difference FY 1986/85*
Cooperative Research				
STIA	$ 9.8	$ 10.5	$ 9.7	$ -0.8
International Related Research Projects				
Disciplinary Activities	73.5	76.9	81.5	4.6
Special Activities				
Antarctic Research	22.5	24.8	26.8	2.0
Ocean Drilling	26.3	27.6	28.9	1.3
International Science Organizations	1.1	1.1	0.7	-0.4
Indo-U.S. Initiative	2.0	2.0	1.7	-0.3
Special Foreign Currency	2.9	2.8	1.0	-1.8
TOTAL	**$138.1**	**$145.7**	**$150.3**	**$ 4.6**

3. EQUIPMENT AND INSTRUMENTATION

The National Science Foundation provides support for equipment and instrumentation to meet the needs of experimental research in four major ways:

- Through the provision of instrumentation to individual projects and investigators;
- Through the provision of multiuser equipment at the department level;
- Through the support of university-based centers and facilities such as the Materials Research Laboratories, which permit coordinated multi-disciplinary thrusts and require a diversity of scientific and engineering competence; and
- Through the funding of national centers, such as those for the Astronomical Sciences, that provide major facilities serving hundreds of scientists.

Between FY 1983 and FY 1985, NSF support for facilities, equipment, and instrumentation at universities and centers doubled from $120 million to $240 million. This trend is continued in the FY 1986 Budget Request with an increase of $32.7 million above the FY 1985 level planned for high priority equipment and instrumentation, including the support of local computing equipment. Support for land, buildings, and fixed equipment is reduced and the total increase for Facilities, Equipment, and Instrumentation is $31.1 million, 13.0 percent above the FY 1985 level.

Support in FY 1986 for construction or acquisition of major facilities started in FY 1985 include the Very Long Base Array (VLBA) radio telescope, the acquisition of an advanced computer for the National Center for Atmospheric Research, and the planning and development of centers for advanced scientific computing.

R&D FACILITIES, EQUIPMENT, AND INSTRUMENTATION
(Millions of Dollars)

	Actual FY 1984	*Estimate FY 1985*	*Estimate FY 1986*	*Increase (Percent)*	
				FY 86/84	*FY 86/85*
Mathematical and Physical Sciences	$74.8	$88.7	$102.1	36.5%	15.1%
Engineering	17.4	21.8	25.9	48.9	19.4
Biological, Behavioral, and Social Sciences	22.2	26.7	31.6	42.3	18.4
Astronomical, Atmospheric, Earth and Ocean Sciences	48.8	50.7	53.3	9.2	5.1
U.S. Antarctic Program	22.2	20.9	26.0	17.1	24.4
Scientific, Technological and International Affairs	2.2	3.2	3.1	40.9	-0.3
Advanced Scientific Computing	—0—	22.2	23.3	—	4.7
Science and Engineering Education	0.9	5.7	5.7	533.3	13.0
TOTAL, NSF	**$188.5**	**$239.9**	**$271.0**	**44.0%**	**13.0%**

4. COMPUTERS AND COMPUTER SCIENCE AND ENGINEERING

Computers play a central role in every discipline of science and engineering. The goals of the National Science Foundation in computer activities are to make advanced computer technology available for research and education and to support research which provides the basis for future advances in computer technology. The Foundation accomplishes these goals through three types of activities:

- Providing supercomputer facilities for use in research, developing a national science network to improve access to and sharing of facilities and software;

- Assisting with the purchase and operation of local computing facilities such as workstations, mini-computers, graphics equipment, and array processors; and

- Supporting research in computer science and in other areas that advance the state of computer technology. NSF support for research in computer science and engineering is provided through several programs, and involves work in computer and information science, computer engineering, computational mathematics and electronic materials.

A matter of particular importance to NSF is the training of advanced graduate students in computer science and engineering and applications. The facilities that receive NSF support are used extensively by graduate students to conduct the research which is the capstone of their graduate training and often performed in NSF-supported research projects. The NSF-sponsored research projects in computer science and engineering are the main source of support for graduate students in that field, providing stipends and research costs to several hundred students each year.

In FY 1986, support for computer related activities increases by 11.4 percent from $200.8 million in FY 1985 to a total of $223.7 million as follows.

- Supercomputer Facilities provides support for establishing and operating supercomputer centers for use in science and engineering research and training. Support increases from $32.5 million to $38.7 million. Support for supercomputer activities at NCAR remains at $12.0 million.

- Networking provides support for establishing and operating networks to provide easy access from the normal working location of scientists and engineers to remote computing facilities. It also provides advanced communication services to the scientific community to promote collaboration and resource sharing and rapid dissemination of research results. Support increases from $5.0 million to $5.5 million.

- Local Facilities provides help with the acquisition and operation of essential computing facilities at the researcher's office or laboratory and includes workstations, mini-computers, graphics facilities, local area networks, array processors, and other computing facilities or services needed on a daily basis to carry out research. Support increases from $79.1 million to $90.0 million.

- Research on Computers provides support for research in computational mathematics, computer systems and design, information science, materials research, and other areas that help advance the state-of-the-art in computer technology. Support increases from $72.0 million to $77.50 million.

Several other federal agencies, especially the Department of Defense, the Department of Energy, the National Aeronautics and Space Administration, and the National Institutes of Health also provide computer support for scientists and engineers who are working on projects relevant to those agencies. NSF is unique because it does not impose criteria of specific mission relevance on the selection of the projects it supports. This has very important consequences as highlighted in the Research Briefing on Computer Architecture report prepared for the Committee on Science, Engineering and Public Policy of the National Academy of Sciences in the summer of 1984. That report showed NSF to have been the source of support for much of the early conceptual work in highly parallel computer architectures years before the relevance of that work to defense, energy, and industry was recognized. Many of the ideas and people supported by NSF have subsequently been taken up by the mission agencies and are being supported by them further to develop those concepts into working prototype machines so their effectiveness can be evaluated in the context of mission specific problems. The Strategic Computer Programs of Defense Advanced Research Project Agency and the computer research support program of Department of Energy are cases in point.

5. RESEARCH RELATED TO BIOTECHNOLOGY

NSF proposes to strengthen its biotechnology-related research during the coming fiscal year by providing an increase at $9.3 million or 13.3 percent over the FY 1985 level at approximately $70.0 million. Historically, NSF provided a large portion of the long term basic research support in the biological and biochemical sciences that led to the biological revolution and the development of modern biotechnology. Currently, NSF supports a wide variety of research activities such as fundamental genetics of bacteria and higher organisms, cell culture biology, nucleic acid chemistry and plant cell molecular biology. These biotechnology related activities involve research encompassing both science and engineering. The findings from the current work form the underpinnings of future progress and the base upon which biotechnology efforts will be built. NSF is also the primary supporter of research in ecology and systematics which forms the scientific foundation for answering questions about the impact of genetically engineered organisms on natural systems. The realization of the promise of biotechnology for the economic and health interests of the Nation is dependent on a broad base of fundamental research findings. NSF is well positioned to continue to build this scientific base through support of multidisciplinary research in science and engineering. NSF will direct the additional funding to selected target areas within chemistry, biology and engineering, including:

- Plant cell protoplast culture, cell fusion and the biochemistry of plant cell regeneration. Research in these areas is critical to the development of plant cell biotechnology both for the generation of new food and fiber crops and for the utilization of plant products in medicine and industry.

- Identification and production of physiologically active peptides such as neuropeptides and hormones as well as plant cell products which impart natural resistance to insects and disease.

- Design and development of bioreactors including modern approaches to fermentation technology and methods of product recovery.

- Training of personnel, especially the cross training between molecular biology and chemical and manufacturing engineering, molecular biology and plant biology and molecular biology and ecology.

This increased effort is intended to lead to new applications in areas of significance to the nation, such as agriculture and medicine, and to new uses of biotechnology as a key research tool for science.

Explanation of Prior Year Carryover

In addition to the FY 1985 appropriations, unobligated balances totaling $33,609,280 are available for obligation in FY 1985. The source of these funds are:

- No-Year Funds - Prior to FY 1974, NSF appropriations were made on a no-year basis and unobligated funds were available until expended. As a result of the deobligation in FY 1984 of obligations made in previous year, there is a balance of $87,414 available for obligation in FY 1985.

  As part of the Second Supplemental Appropriation Act of 1984 (PL 98-396), the Foundation was appropriated $1,500,000 for the Advanced Scientific Computing program. Since the Act was passed August 22, 1984, there was not sufficient time prior to September 30, 1984 for obligating these funds and they, therefore, have been carried over into FY 1985.

- The unobligated balance of the FY 1984 Research and Related Activities Appropriation is $465,835 and results from relatively minor balances in over 300 individual operating plan accounts. Of this amount $370,000 will be used in FY 1985 to partially fund the costs of the January 1985 pay increase for which the Foundation will absorb the full costs, the balance, $95,835, along with the unobligated no-year funds will be used to support the requirements of the Arctic Research and Policy Act.

- Science and Engineering Education Activities - $31,450,278 of unobligated FY 1984 appropriation remains available for obligation in FY 1985. Because of the expansion of these activities, the time required to develop specific programs and the time required for soliciting and reviewing proposals, the awards made in FY 1984 did not require all funds available. These unobligated funds will be used in FY 1985 for the planned FY 1984 activities.

- Special Foreign Currency - A total of $37,457 of unobligated FY 1984 funds will be utilized in the FY 1985 program.

- U.S. Antarctic Program - A total of $68,296 remained unobligated at the end of FY 1984 and will be available for use in the program during FY 1985.

BUDGET SUMMARY OF OBLIGATIONS BY ACTIVITY AND SUBACTIVITY SHOWING DOLLAR AND PERCENTAGE CHANGES, FY 1986/FY 1985

(Millions of Dollars)

Activity & Subactivity	Actual FY 1984	Current Plan FY 1985	Estimate FY 1986	Difference FY 1986/FY 1985 Amount	Difference FY 1986/FY 1985 Percent
RESEARCH & RELATED ACTIVITIES					
Mathematical and Physical Sciences					
Mathematical Sciences	$41.3	$47.5	$54.7	$7.2	15.1
Computer Research	33.7	39.1	41.7	2.6	6.6
Physics	104.4	115.5	123.4	7.9	6.8
Chemistry	79.4	87.4	93.5	6.1	6.9
Materials Research	96.3	107.1	115.7	8.6	8.0
Subtotal, MPS	355.1	396.6	429.0	32.4	8.1
Engineering					
Chemical, Biochemical, and Thermal Engineering	28.7	29.4	29.4	—0—	—0—
Mechanics, Structures, and Materials Engineering	22.7	23.0	23.6	0.6	2.6
Electrical, Communications, and Systems Engineering	23.7	25.4	26.7	1.3	5.1
Design, Manufacturing, and Computer Engineering	10.8	17.1	20.4	3.3	19.2
Emerging and Critical Engineering Systems	32.7	35.1	38.5	3.4	9.6
Cross-Disciplinary Research	10.0	20.0	31.5	11.5	57.5
Subtotal, Engineering	128.6	150.0	170.1	20.1	13.4
Biological, Behavioral, and Social Sciences					
Molecular Biosciences	54.2	60.9	64.1	3.2	5.2
Cellular Biosciences	47.3	50.9	54.4	3.5	6.8
Biotic Systems and Resources	52.9	58.4	63.0	4.6	7.8
Behavioral and Neural Sciences	38.2	44.4	47.1	2.7	6.0
Social & Economic Sciences	24.6	28.5	33.9	5.4	18.9
Information Science and Technology	6.2	8.9	9.5	0.6	6.7
Subtotal, BBS	223.4	252.0	272.0	20.0	7.9
Astronomical, Atmospheric, Earth and Ocean Sciences					
Astronomical Sciences	77.3	83.0	88.7	5.7	6.8
Atmospheric Sciences	88.4	94.2	97.6	3.4	3.6
Earth Sciences	41.4	45.9	51.5	5.6	12.2
Ocean Sciences	114.2	120.7	125.6	4.9	4.0
Arctic Research Program	7.3	7.9	8.8	0.9	11.3
Subtotal, AAEO	328.6	351.7	372.2	20.5	5.8
Scientific, Technological, and International Affairs					
Industrial Science and Technological Innovation	8.1	13.4	13.3	-0.1	-.8
International Cooperative Scientific Activities	12.9	13.6	12.1	-1.5	-11.1
Policy Research & Analysis	4.6	4.7	2.0	-2.7	-57.5
Science Resources Studies	4.2	4.3	4.0	-0.3	-7.0
Research Initiation and Improvement	6.4	8.5	7.0	-1.5	-17.7
Subtotal, STIA	36.2	44.5	38.4	-6.1	-13.8
Advanced Scientific Computing	6.0	41.5	46.2	4.7	11.3
Program Development and Management	66.3	70.7	69.9	-0.8	-1.2
Total, Research and Related Activities	1,144.2	1,307.0	1,397.8	90.8	6.9
U.S. ANTARCTIC PROGRAM					
U.S. Antarctic Research Program	10.4	11.0	11.5	0.5	4.5
Operations Support	92.0	99.9	108.6	8.7	8.7
Total, U.S. Antarctic Program	102.4	110.9	120.1	9.2	8.2
SCIENCE AND ENGINEERING EDUCATION					
Research Career Development	20.3	27.3	27.3	—0—	—0—
College Science Instrumentation	—0—	5.0	5.0	—0—	—0—
Material Development and Research	23.4	22.7	22.7	—0—	—0—
Teacher Enhancement and Informal Science Education	11.9	25.0	25.0	—0—	—0—
Studies and Program Assessment	1.8	2.0	2.0	—0—	—0—
Total, Science and Engineering Education	57.4	82.0	82.0	—0—	—0—
SPECIAL FOREIGN CURRENCY	2.9	2.8	1.0	-1.8	-64.3
Total, NSF	**$1,306.9**	**$1,502.7**	**$1,600.9**	**$98.2**	**6.5**

SUMMARY BUDGET INFORMATION BY ACTIVITY AND SUBACTIVITY FY 1984-FY 1986

The following table summarizes the National Science Foundation's FY 1984 through FY 1986 budgets by appropriation title.

Activity	*Actual FY 1984*	*Current Request FY 1985*	*Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
A. Summary of Funding Level by Activity Research and Related Activities					
Mathematical and Physical Sciences	$355.046.031	$416.710.000	$396.622.000	$428.970.000	$32.348.000
Engineering	128.614.515	147.100.000	150.037.000	170.070.000	20.033.000
Biological, Behavioral and Social Sciences	223.401.248	253.120.000	251.967.000	272.050.000	20.083.000
Astronomical, Atmospheric, Earth and Ocean Sciences	328.635.030	373.480.000	351.728.249	372.170.000	20.441.751
Scientific, Technological and International Affairs	38.211.148	46.900.000	44.460.000	38.360.000	-6.100.000
Advanced Scientific Computing	6.009.400	—0—	41.460.000	46.230.000	4.770.000
Program Development and Management	66.256.632	70.902.000	70.689.000	69.900.000	-789.000
Subtotal, Research and Research Activities	1.144.174.004	1.308.212.000	1.306.963.249	1.397.750.000	90.786.751
Unobligated Balances and Other Adjustments	-1.914.004	—0—	-5.051.249	—0—	5.051.249
Research and Related Activities Appropriation	1.142.260.000	1.308.212.000	1.301.912.000	1.397.750.000	95.838.000
U.S. ANTARCTIC PROGRAM ACTIVITIES					
U.S. Antarctic Research Program	10.432.804	11.000.000	11.000.000	11.500.000	500.000
Operations Support	91.954.900	104.080.000	99.898.296	108.600.000	8.701.704
Subtotal, U.S. Antarctic Program Activities	102.387.704	115.080.000	110.898.296	120.100.000	9.201.704
Unobligated Balances and Other Adjustments	68.296	—0—	-68.296	—0—	68.296
U.S. Antarctic Program Activities Appropriation	102.456.000	115.080.000	110.830.000	120.100.000	9.270.000
Science and Engineering Education Activities Appropriation					
Research Career Development	20.311.329	21.000.000	27.300.000	27.300.000	—0—
College Science Instrumentation	—0—	—0—	5.000.000	5.000.000	—0—
Material Development and Research	23.432.567	27.700.000	22.700.000	22.700.000	—0—
Teacher Enhancement and Informal Science Education	11.890.402	25.000.000	25.000.000	25.000.000	—0—
Studies and Program Assessment	1.809.084	2.000.000	2.000.000	2.000.000	—0—
Subtotal, Science and Engineering Education Activities	57.443.382	75.700.000	82.000.000	82.000.000	—0—
Unobligated Balances and Other Adjustments	17.556.618	—0—	5.000.000	-31.450.278	-36.450.278
Science and Engineering Education Activities Appropriation	75.000.000	75.700.000	87.000.000	50.549.722	-36.450.278
Special Foreign Currency Appropriation					
Research and Related Activities	2.910.776	2.800.000	2.837.457	1.000.000	-1.837.457
Unobligated Balances and Other Adjustments	-10.776	—0—	-37.457	—0—	37.457
Special Foreign Currency Appropriation	**2,900,000**	**2,800,000**	**2,800,000**	**1,000,000**	**-1,800,000**
TOTAL, NSF APPROPRIATIONS	**1,322,616,000**	**1,501,792,000**	**1,502,542,000**	**1,569,399,722**	**66,857,722**

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
B. Mathematical and Physical Sciences					
I. Mathematical Sciences					
Classical Analysis	$3.928.462	$4.800.000	$4.586.000	$5.355.000	$769.000
Modern Analysis	4.070.599	4.950.000	4.712.000	5.490.000	778.000
Geometric Analysis	3.857.881	4.700.000	4.436.000	5.220.000	782.000
Topology and Foundations	5.020.446	5.850.000	5.696.000	6.635.000	939.000
Algebra and Number Theory	6.607.327	7.850.000	7.828.000	9.110.000	1.282.000
Applied Mathematics	5.329.501	6.700.000	6.403.000	7.640.000	1.237.000
Statistics and Probability	4.660.603	6.000.000	5.627.000	6.690.000	1.063.000
Special Projects	7.759.262	9.650.000	8.200.000	8.550.000	350.000
Subtotal	$41.234.081	$50.500.000	$47.490.000	$54.690.000	$7.200.000
II. Computer Research					
Theoretical Computer Science	$3.862.933	$4.300.000	$4.100.000	$4.750.000	$650.000
Software Systems Science	3.671.240	4.200.000	4.000.000	4.400.000	400.000
Software Engineering	3.390.156	3.700.000	3.500.000	3.850.000	350.000
Intelligent Systems	3.383.281	3.650.000	5.400.000	5.400.000	—0—
Computer Systems Design	3.540.560	4.000.000	3.800.000	4.180.000	380.000
Coordinated Experimental Research	13.553.139	16.700.000	15.702.000	16.300.000	598.000
Special Projects	924.047	1.150.000	1.090.000	1.060.000	-30.000
Computer Research Equipment	1.394.956	1.650.000	1.500.000	1.790.000	290.000
Subtotal	$33.720.312	$39.350.000	$39.092.000	$41.730.000	$2.638.000
III. Physics					
Elementary Particle Physics	$35.071.236	$42.500.000	$40.500.000	$44.770.000	$4.270.000
Intermediate Energy Nuclear Physics	16.662.422	19.150.000	18.300.000	18.800.000	500.000
Nuclear Physics	22.126.570	24.820.000	23.200.000	23.400.000	200.000
Atomic, Molecular, and Plasma Physics	12.373.270	13.600.000	13.000.000	13.700.000	700.000
Theoretical Physics	12.343.480	13.800.000	13.500.000	14.400.000	900.000
Gravitational Physics	5.794.525	7.900.000	7.060.000	8.300.000	1,240.000
Subtotal	$104.371.503	$121.770.000	$115.560.000	$123.370.000	$7.810.000
IV. Chemistry					
Structural Chemistry and Thermodynamics	$13.755.501	$15.470.000	$15.100.000	$15.910.000	$810.000
Chemical Physics	13.238.155	14.780.000	14.120.000	15.190.000	1.070.000
Chemical Dynamics	14.266.386	16.950.000	15.370.000	15.990.000	620.000
Chemical Analysis	10.096.771	10.960.000	11.590.000	12.610.000	1.020.000
Synthetic Inorganic and Organometallic Chemistry	8.101.314	9.120.000	9.560.000	10.360.000	800.000
Synthetic Organic and Natural Products Chemistry	9.758.847	11.310.000	11.160.000	11.930.000	770.000
Chemical Instrumentation	10.209.971	13.500.000	10.500.000	11.510.000	1.010.000
Subtotal	$79.426.945	$92.090.000	$87.400.000	$93.500.000	$6.100.000
V. Materials Research					
Solid State Physics	$10.635.521	$12.220.000	$11.440.000	$12.400.000	$960.000
Solid State Chemistry	7.617.101	8.990.000	8.250.000	9.100.000	850.000
Low Temperature Physics	7.217.092	8.180.000	7.850.000	8.400.000	550.000
Condensed Matter Theory	7.487.218	8.890.000	8.220.000	8.900.000	680.000
Metallurgy	8.912.557	10.300.000	9.540.000	10.200.000	660.000
Ceramics and Electronic Materials	5.535.092	6.870.000	6.210.000	6.780.000	570.000
Polymers	6.362.935	7.570.000	6.860.000	7.600.000	740.000
Instrumentation for Materials Research	6.208.579	7.780.000	6.800.000	6.600.000	-200.000
Materials Research Laboratories	26.040.467	30.090.000	28.300.000	30.000.000	1.700.000
National Facilities	10.276.628	12.110.000	11.500.000	12.000.000	500.000
Materials Research Groups	—0—	—0—	2.110.000	3.700.000	1.590.000
Subtotal	$96.293.190	$113.000.000	$107.080.000	$115.680.000	$8.600.000
TOTAL, MATHEMATICAL AND PHYSICAL SCIENCES	$355.046.031	$416.710.000	$396.622.000	$428.970.000	$32.348.000

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
C. Engineering					
I. Chemical, Biochemical, and Thermal Engineering					
Kinetics and Catalysis Engineering	$3,018,409	$3,320,000	$3,200,000	$3,450,000	$250,000
Biochemical and Biomass Engineering	3,233,392	3,300,000	3,000,000	2,880,000	-120,000
Process and Reaction Engineering	3,228,772	3,400,000	3,400,000	3,230,000	-170,000
Multiphase and Interfacial Phenomena	3,668,519	4,540,000	3,600,000	3,600,000	—0—
Separation and Purification Processes	2,300,563	3,040,000	3,150,000	3,500,000	350,000
Thermodynamics and Transport Phenomena	4,337,938	4,600,000	4,210,000	4,440,000	230,000
Thermal Systems and Engineering	8,939,295	10,780,000	8,800,000	8,260,000	-540,000
Subtotal	$28,726,888	$32,960,000	$29,360,000	$29,360,000	$ —0—
II. Mechanics, Structures, and Materials Engineering					
Solid Mechanics	$5,598,966	$6,470,000	$5,600,000	$5,660,000	$60,000
Structures and Building Systems	4,257,320	4,800,000	4,400,000	4,400,000	—0—
Fluid Dynamics and Hydraulics	5,778,378	6,350,000	5,300,000	5,400,000	100,000
Tribology	1,167,139	1,400,000	1,980,000	2,040,000	60,000
Dynamic Systems and Control	2,945,454	3,125,000	2,750,000	2,850,000	100,000
Materials Engineering and Processing	3,007,414	3,470,000	3,000,000	3,300,000	300,000
Subtotal	$22,754,671	$25,615,000	$23,030,000	$23,650,000	$620,000
III. Electrical, Communications, and Systems Engineering					
Solid State and Microstructures	$6,778,346	$7,850,000	$7,220,000	$7,700,000	$480,000
Communications Systems and Signal Processing	4,683,686	5,745,000	5,200,000	5,200,000	—0—
Systems Theory and Operations Research	5,124,421	5,685,000	5,000,000	5,200,000	200,000
Quantum, Electric Waves and Beams	4,932,165	5,890,000	5,000,000	4,600,000	-400,000
Instrumentation, Sensing and Measurement	2,151,321	2,500,000	2,980,000	3,980,000	1,000,000
Subtotal	$23,669,941	$27,670,000	$25,400,000	$26,680,000	$1,280,000
IV. Design, Manufacturing, and Computer Engineering					
Computer Engineering	$3,966,524	$4,650,000	$5,000,000	$5,460,000	$460,000
Design Theory and Methodology	333,357	495,000	1,600,000	3,000,000	1,400,000
Computer-Integrated Engineering	499,507	800,000	1,630,000	3,000,000	1,370,000
Manufacturing Systems	4,484,138	4,920,000	4,970,000	4,970,000	—0—
Automation and Systems Integration	1,495,680	1,850,000	3,960,000	3,960,000	—0—
Subtotal	$10,779,206	$12,715,000	$17,160,000	$20,390,000	$3,230,000

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
V. Emerging and Critical Engineering Systems					
Biotechnology	$606.261	$1.000.000	$1.956.000	$4.300.000	$2.344.000
Bioengineering and Research for the Handicapped	4.643.321	5.460.000	4.580.000	4.680.000	100.000
Lightwave Technology	1.520.661	1.600.000	1.500.000	3.000.000	1.500.000
Earthquake Hazard Mitigation	16.755.679	19.960.000	17.200.000	16.400.000	-800.000
Natural and Man-Made Hazard Mitigation	1.340.816	1.620.000	1.980.000	2.060.000	80.000
Environmental Engineering	5.800.227	5.900.000	5.400.000	5.480.000	80.000
Systems Engineering for Large Structures	2.012.584	2.600.000	2.491.000	2.580.000	89.000
Subtotal	$32.679.549	$38.140.000	$35.107.000	$38.500.000	$3.393.000
VI. Cross-Disciplinary Research					
Engineering Research Centers	$ —0—	$10.000.000	$9.990.000	$25.000.000	$15.010.000
Industry/University Research Centers	2.990.721	(3.000.000)	3.000.000	3.000.000	—0—
Industry/University Research Projects	7.013.539	(7.000.000)	6.990.000	3.490.000	-3.500.000
Subtotal	$10.004.260	$10.000.000	$19.980.000	$31.490.000	$11.510.000
TOTAL, ENGINEERING	$128.614.515	$147.100.000	$150.037.000	$170.070.000	$20.033.000
D. Biological, Behavioral, and Social Sciences					
I. Molecular Biosciences					
Biological Instrumentation	$6.132.120	$7.900.000	$7.710.000	$8.410.000	$700.000
Biochemistry	12.599.148	14.650.000	14.001.000	15.749.000	1.748.000
Biophysics	12.578.518	14.385.000	13.910.000	15.310.000	1.400.000
Prokaryotic Genetics	7.557.028	8.500.000	8.110.000	8.960.000	850.000
Metabolic Biology	13.077.821	15.400.000	14.701.000	15.701.000	1.000.000
Alternative Biological Resources	2.206.436	2.585.000	2.500.000	—0—	-2.500.000
Subtotal	$54.151.071	$63.420.000	$60.932.000	$64.130.000	$3.198.000
II. Cellular Biosciences					
Cell Biology	$10.422.554	$11.600.000	$11.000.000	$11.670.000	$670.000
Cellular Physiology	7.534.694	8.330.000	8.045.000	8.650.000	605.000
Developmental Biology	12.209.134	14.400.000	13.740.000	14.640.000	900.000
Eukaryotic Genetics	7.808.440	8.650.000	8.500.000	9.220.000	720.000
Regulatory Biology	9.316.393	9.960.000	9.570.000	10.200.000	630.000
Subtotal	$47.291.215	$52.940.000	$50.855.000	$54.380.000	$3.525.000
III. Biotic Systems and Resources					
Ecological Science					
Ecology	$7.922.804	$9.280.000	$9.065.800	$10.050.900	$985.100
Ecosystem Studies	16.471.195	18.460.000	17.968.100	19.300.000	1.331.900
Subtotal	$24.393.999	$27.740.000	$27.033.900	$29.350.900	$2.317.000
Systematic and Population Biology					
Systematic Biology	$10.928.545	$12.330.000	$12.013.300	$13.023.300	$1.010.000
Population Biology and Physiological Ecology	8.986.839	10.040.000	9.767.600	10.667.500	899.900
Biological Research Resources	8.645.450	9.770.000	9.585.200	9.978.300	393.100
Subtotal	$28.560.834	$32.140.000	$31.366.100	$33.669.100	$2.303.000
Subtotal	$52.954.833	$59.880.000	$58.400.000	$63.020.000	$4.620.000

Level of Funding by Program—Continued

Activity	Actual FY 1984	Request FY 1985	Current Plan FY 1985	Estimate FY 1986	Difference FY 1986/85
IV. Behavioral and Neural Sciences					
Neuroscience					
Molecular and Cellular Neurobiology	$4,796,100	$5,300,000	$5,200,000	$5,550,000	$350,000
Integrative Neural Systems	3,946,354	5,000,000	4,900,000	5,200,000	300,000
Developmental Neuroscience	4,577,655	5,480,000	5,270,000	5,650,000	380,000
Sensory Physiology and Perception	6,270,770	7,300,000	7,200,000	7,650,000	450,000
Psychobiology	4,521,439	4,400,000	4,400,000	4,730,000	330,000
Subtotal	$24,112,318	$27,480,000	$26,970,000	$28,780,000	$1,810,000
Cognitive Science					
Memory and Cognitive Processes	$2,617,236	$2,800,000	$4,500,000	$4,600,000	$100,000
Social and Developmental Psychology	2,433,491	2,700,000	3,100,000	3,230,000	130,000
Linguistics	2,475,595	2,500,000	3,100,000	3,220,000	120,000
Subtotal	$7,526,322	$8,000,000	$10,700,000	$11,050,000	$350,000
Anthropology					
Anthropology	$6,599,781	$6,800,000	$6,700,000	$7,300,000	$600,000
Subtotal	$38,238,421	$42,280,000	$44,370,000	$47,130,000	$2,760,000
V. Social and Economic Science					
Economics and Geography					
Economics	$9,368,865	$10,250,000	$10,180,000	$14,340,000	$4,160,000
Geography	1,012,329	1,300,000	1,340,000	1,600,000	260,000
Subtotal	$10,381,194	$11,550,000	$11,520,000	$15,940,000	$4,420,000
Social Measurement and Analysis					
Sociology	$3,050,944	$3,650,000	$3,850,000	$4,200,000	$350,000
Measurement Methods and Data Improvement	3,653,519	3,400,000	3,430,000	3,800,000	370,000
History and Philosophy of Science	1,348,044	1,600,000	1,690,000	2,200,000	510,000
Subtotal	$8,052,507	$8,650,000	$8,970,000	$10,200,000	$1,230,000
Political and Policy Sciences					
Political Science	$2,727,943	$3,600,000	$3,600,000	$4,100,000	$500,000
Law and Social Sciences	1,397,944	1,700,000	1,840,000	2,200,000	360,000
Regulation and Policy Analysis	1,057,944	1,300,000	1,290,000	—0—	−1,290,000
Decision and Management Science	972,117	1,200,000	1,290,000	1,450,000	160,000
Subtotal	$6,155,948	$7,800,000	$8,020,000	$7,750,000	$−270,000
Subtotal	$24,589,649	$28,000,000	$28,510,000	$33,890,000	$5,380,000
VI. Information Science and Technology					
Information Science	$4,039,971	$4,000,000	$5,400,000	$5,500,000	$100,000
Information Technology	1,053,626	1,300,000	1,750,000	2,000,000	250,000
Information Impact	1,082,462	1,300,000	1,750,000	2,000,000	250,000
Subtotal	$6,176,059	$6,600,000	$8,900,000	$9,500,000	$600,000
TOTAL, BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES	$223,401,248	$253,120,000	$251,967,000	$272,050,000	$20,083,000

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
E. Astronomical, Atmospheric, Earth, and Ocean Sciences					
I. Astronomical Sciences					
Astronomy Project Support					
Solar System Astronomy	$1,307,638	$1,270,000	$1,250,000	$1,300,000	$50,000
Stars and Stellar Evolution	6,301,686	6,490,000	6,057,000	6,600,000	543,000
Galactic Astronomy	4,558,000	5,290,000	4,887,000	5,000,000	113,000
Extragalactic Astronomy	5,909,200	7,520,000	7,066,000	8,200,000	1,134,000
Astronomical Instrumentation and Development	9,604,746	8,230,000	8,057,000	7,360,000	-697,000
Electromagnetic Spectrum Management	100,000	100,000	100,000	100,000	—0—
Subtotal	$27,781,270	$28,900,000	$27,417,000	$28,560,000	$1,143,000
National Astronomy and Ionosphere Center					
Scientific Research Support	$6,426,433	$6,615,000	$6,415,000	$6,665,000	$250,000
Less NASA Support	-315,000	-315,000	-315,000	-315,000	—0—
Subtotal	$6,111,433	$6,300,000	$6,100,000	$6,350,000	$250,000
National Optical Astronomy Observatories					
Scientific Research Support	$23,112,001	$24,749,000	$22,937,000	$24,068,000	$1,131,000
Management Fee	463,000	486,000	378,000	417,000	39,000
Less DOD Support	-415,000	-435,000	-435,000	-435,000	—0—
Subtotal	$23,160,001	$24,800,000	$22,880,000	$24,050,000	$1,170,000
National Radio Astronomy Observatory					
Scientific Research Support	$19,930,000	$33,070,000	$17,300,000	$17,830,000	$530,000
VLBA Construction	—0—	(15,000,000)	9,000,000	11,500,000	2,500,000
Management Fee	330,000	330,000	350,000	380,000	30,000
Subtotal	$20,260,000	$33,400,000	$26,650,000	$29,710,000	$3,060,000
Subtotal	$77,312,704	$93,400,000	$83,047,000	$88,670,000	$5,623,000
II. Atmospheric Sciences					
Atmospheric Sciences Project Support					
Aeronomy	$6,275,240	$6,550,000	$6,456,000	$6,701,000	$245,000
Atmospheric Chemistry	6,621,575	7,250,000	6,983,000	7,249,000	266,000
Climate Dynamics	7,173,891	7,790,000	7,560,000	7,848,000	288,000
Experimental Meteorology	5,019,498	5,640,000	5,312,000	5,514,000	202,000
Global Atmospheric Research Program (GARP)	4,833,000	4,500,000	4,278,000	3,900,000	-378,000
Meteorology	8,316,279	9,100,000	8,843,000	9,720,000	877,000
Solar Terrestrial Research	7,064,500	7,690,000	7,431,000	7,713,000	282,000
Subtotal	$45,303,983	$48,520,000	$46,863,000	$48,645,000	$1,782,000

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
National Center for Atmospheric Research					
Atmospheric Analysis and Prediction	$3.504.700	$3.645.000	$3.591.000	$3.727.000	$136.000
Atmospheric Chemistry	2.752.585	2.863.000	2.718.000	2.821.000	103.000
Convective Storms	2.306.630	2.386.000	2.397.000	2.488.000	91.000
Advanced Study Program	1,360.200	1,535.000	1.392.000	1.445.000	53.000
High Altitude Observatory	3.376.860	3.456.000	3.480.000	3.613.000	133.000
Atmospheric Technology	6.836.162	7,472.000	7.181.000	7,454.000	273.000
Scientific Computing	9,875.950	13,425.000	11.571.000	11.821.000	250.000
Administration and Support Services	4,659.050	4,928,000	5.079.000	5.273.000	194.000
Physical Plant Operation and Maintenance	3,716.636	5.269,000	5.051,000	5,243.000	192.000
Contractor Fee	957.634	941.000	984.000	1,021,000	37,000
Subtotal	$39.346,407	$45.920.000	$43.444.000	$44.906.000	$1.462.000
Upper Atmospheric Research Facility	$3.729.500	$4.100.000	$3.939.000	$4.089.000	$150.000
Subtotal	$88.379.890	$98.540.000	$94.246.000	$97.640.000	$3.394.000
III. Earth Sciences					
Stratigraphy and Paleontology	$3.699.952	$3.900.000	$3.800.000	$3.800.000	$ —0—
Surficial Processes	2,700.000	2,900.000	2.900.000	2.900.000	—0—
Crustal Structure and Tectonics	3,970.584	4.000.000	3.900.000	3.900.000	—0—
Seismology	4.735.488	5.000.000	4.600.000	4.600.000	—0—
Experimental and Theoretical Geophysics	4,763.414	5,000.000	4.900.000	4.900.000	—0—
Petrogenesis and Mineral Resources	3,399.620	4.100.000	4,000.000	4.000.000	—0—
Volcanology and Mantle Geochemistry	3,599.917	3.900.000	3.700.000	3.700.000	—0—
Experimental and Theoretical Geochemistry	5,716.625	6.100.000	6.000.000	6.000.000	—0—
Instrumentation and Facilities	4,599.600	6.000.000	5.056.000	6.300.000	1,244.000
Continental Lithosphere	3,700.000	7,700.000	7.000.000	11.400.000	4.400.000
Subtotal	$41.385.200	$48.600.000	$45.856.000	$51.500.000	$5.644.000
IV. Ocean Sciences					
Ocean Science Research Support					
Physical Oceanography	$15,592.846	$17.200.000	$16.800.000	$17.250.000	$450.000
Marine Chemistry	11,957.563	13,400.000	12.500.000	12.940.000	440.000
Submarine Geology and Geophysics	14,613.081	16,100.000	15.250.000	15.700.000	450.000
Biological Oceanography	12,924.264	14.200.000	13.607.000	14.050.000	443.000
Subtotal	$55,087.754	$60.900.000	$58.157.000	$59.940.000	$1.783.000
Oceanographic Facilities Support	$32.894.077	$38.440.000	$34.909.000	$36.790.000	$1.881.000
Ocean Drilling Program					
Ocean Drilling Program	$33.268.812	$37.600.000	$37.600.000	$41.350.000	$3.750.000
Less Foreign Funding	–5.320.665	–10,000.000	–10.000.000	–12.500.000	–2.500.000
Less Other U.S. Agency Funds	–1,645.150	—0—	—0—	—0—	—0—
Subtotal	$26.293.997	$27.600.000	$27.600.000	$28.850.000	$1.250.000
Subtotal	$114.275.828	$124.940.000	$120.666.000	$125.580.000	$4.914.000
V. Arctic Research Program					
Arctic Research Projects	$7.281.408	$8.000.000	$7.733.249	$8.100.000	$366.751
Arctic Research and Policy Act Support	—0—	—0—	180.000	680.000	500.000
Subtotal	$7.281.408	$8.000.000	$7.913.249	$8.780.000	$866.751
TOTAL, ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES	$328.635.030	$373.480.000	$351.728.249	$372.170.000	$20.441.751

Level of Funding by Program—Continued

Activity	Actual FY 1984	Request FY 1985	Current Plan FY 1985	Estimate FY 1986	Difference FY 1986/85
F. Scientific, Technological, and International Affairs					
I. Industrial Science and Technological Innovation					
Industry/University Cooperative Research Projects	($6.964.947)	$7.000.000	($6.990.000)	($7.000.000)	($10.000)
Small Business Innovation Research	7.098.044	12.400.000	12.400.000	13.300.000	900.000
Industry/University Cooperative Research Centers	(2.970.000)	3.000,000	(3.000.000)	(3.000.000)	—0—
Productivity Improvement Research	994.599	1.000.000	1.000,000	—0—	-1.000.000
Subtotal	$8.092.643	$23.400.000	$13.400.000	$13.300.000	$-100.000
II. International Cooperative Scientific Activities					
International Cooperative Science	$11.858.928	$4.400.000	$12.490.000	$11.390.000	$-1.100.000
International Scientific Organizations and Resources	1.077.249	1.100.000	1.100.000	700.000	-400.000
Subtotal	$12.936.177	$5.500.000	$13.590.000	$12.090.000	$-1.500.000
III. Policy Research and Analysis					
Science and Innovation Policy	$1.732.500	$1.800.000	$1.800.000	$ —0—	$-1.800.000
Policy Sciences	1.850.500	1.800.000	1.800.000	—0—	-1.800.000
Technology and Resource Policy	1.000.999	1.100.000	1.090.000	—0—	-1.090.000
Policy Research and Analysis	—0—	—0—	—0—	1.990.000	1.990.000
Subtotal	$4.583.999	$4.700.000	$4.690.000	$1.990.000	$-2.700.000
IV. Science Resources Studies					
Scientific and Technical Personnel	$2.355.965	$2.100.000	$2.090.000	$2.090.000	$ —0—
Funding of Science and Technology	994.576	1.400.000	1.400.000	1.300.000	-100.000
Modeling & Special Science and Technology Indicators	827.138	800.000	800.000	600.000	-200.000
Subtotal	$4.177.679	$4.300.000	$4.290.000	$3.990.000	$-300.000
V. Research Initiation and Improvement					
Visiting Professorships for Women	$2.057.352	$2.000.000	$2.000.000	$2.000.000	$ —0—
Research Opportunities for Women	—0—	500.000	(500.000)	(1.000.000)	(500.000)
Minority Research Initiation	(2.480.000)	2.500.000	(2.500.000)	(2.500.000)	—0—
Research Improvement in Minority Institutions	2,475.000	2.500.000	4.990.000	4.990.000	—0—
Intergrovernmental Science and Technology	495.000	500.000	500.000	—0—	-500.000
Ethics and Values in Science and Technology	990.000	1.000.000	1.000.000	—0—	-1.000.000
Experimental Program to Stimulate Competitive Research	(137.392)	—0—	(1.000.000)	(2.000.000)	(1.000.000)
NSF Planning and Evaluation	403.298	—0—	(2.000.000)	(2.000.000)	—0—
Support for Predominantly Undergraduate Institutions	(41.243.253)	(42.422.000)	(42.400.000)	(44.400.000)	(2.000.000)
Subtotal	$6.420.650	$9.000.000	$8.490.000	$6.990.000	$-1.500.000
TOTAL, SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS	$36.211.148	$46.900.000	$44.460.000	$38.360.000	$-6.100.000

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
G. Advanced Scientific Computing					
Advanced Scientific Computing	$6,009,400	$(20,000,000)	$41,460,000	$46,230,000	$4,770,000
H. Program Development and Management					
Program Development and Management	$66,256,632	$70,902,000	$70,689,000	$69,900,000	$-789,000
Full-time Equivalent, Permanent	1,039	1,053	1,053	1,033	-20
Full-time Equivalent, Other	142	141	141	141	—0—
Subtotal	1,181	1,194	1,194	1,174	-20
TOTAL, RESEARCH AND RELATED ACTIVITIES	$1,144,174,004	$1,308,212,000	$1,306,963,249	$1,397,750,000	$90,786,751
Unobligated Balances and Other Adjustments	-1,914,004	—0—	-5,051,249	—0—	5,051,249
Research and Related Activities Appropriation	$1,142,260,000	$1,308,212,000	$1,301,912,000	$1,397,750,000	$95,838,000
I. U.S. Antarctic Program					
I. U.S. Antarctic Research Program					
U.S. Antarctic Research Program	$10,432,804	$11,000,000	$11,000,000	$11,500,000	$500,000
II. Operations Support Program					
Direct Science Support	$12,054,900	$11,800,000	$13,780,000	$15,300,000	$1,520,000
Base Level Support	60,400,000	68,980,000	67,818,296	70,000,000	2,181,704
Major Construction and Procurement	19,500,000	23,300,000	18,300,000	23,300,000	5,000,000
Subtotal	$91,954,900	$104,080,000	$99,898,296	$108,600,000	$8,701,704
TOTAL, U.S. ANTARCTIC PROGRAM	$102,387,704	$115,080,000	$110,898,296	$120,100,000	$9,201,704
Unobligated Balances and Other Adjustments	68,296	—0—	-68,296	—0—	68,296
U.S.Antarctic Program Activities Appropriation	$102,456,000	$115,080,000	$110,830,000	$120,100,000	$9,270,000
J. Science and Engineering Education					
Research Career Development	$20,311,329	$21,000,000	$27,300,000	$27,300,000	$ —0—
College Science Instrumentation	—0—	—0—	5,000,000	5,000,000	—0—
Materials Development and Research	23,432,567	27,700,000	22,700,000	22,700,000	—0—
Teacher Enhancement and Informal Science Education .	11,890,402	25,000,000	25,000,000	25,000,000	—0—
Studies and Program Assessment	1,809,084	2,000,000	2,000,000	2,000,000	—0—
TOTAL, SCIENCE AND ENGINEERING EDUCATION	$57,443,382	$75,700,000	$82,000,000	$82,000,000	$ —0—
Unobligated Balances and Other Adjustments	17,556,618	—0—	5,000,000	-31,450,278	-36,450,278
Science and Engineering Education Activities Appropriation	$75,000,000	$75,700,000	$87,000,000	$50,549,722	$-36,450,278

Level of Funding by Program—Continued

Activity	*Actual FY 1984*	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
K. Special Foreign Currency Program					
Special Foreign Currency	$2,910,776	$2,800,000	$2,837,457	$1,000,000	$–1,837,457
Unobligated Balances and Other Adjustments	–10,776	—0—	–37,457	—0—	37,457
Special Foreign Currency Program Appropriation	$2,900,000	$2,800,000	$2,800,000	$1,000,000	$–1,800,000
TOTAL, NSF APPROPRIATION	**$1,322,616,000**	**$1,501,792,000**	**$1,502,542,000**	**$1,569,399,722**	**$66,857,722**

Numbers enclosed in parentheses are non-adds for comparison purposes only.

FY 1984 Actual obligations have been adjusted to permit comparison with programmatic changes reflected in the FY 1985 Current Plan and the FY 1986 Estimate.

National Science Foundation

RESEARCH AND RELATED ACTIVITIES APPROPRIATION

ANALYSIS OF CHANGES IN OBLIGATED LEVELS

FY 1984—FY 1986

	Obligations
FY 1984 Obligated Level	$1,144,174,004
FY 1985:	
Increases:	
Mathematical and Physical Sciences	41,575,989
Engineering	21,422,485
Biological, Behavioral and Social Sciences	28,565,752
Astronomical, Atmospheric, Earth and Ocean Sciences	23,093,219
Scientific, Technological and International Affairs	8,248,852
Advanced Scientific Computing	35,450,600
Program Development and Management	4,432,368
Subtotal	162,789,245
FY 1985 Obligated Level	1,306,963,249
FY 1986:	
Increases:	
Mathematical and Physical Sciences	32,348,000
Engineering	20,033,000
Biological, Behavioral and Social Sciences	20,083,000
Astronomical, Atmospheric, Earth and Ocean Sciences	20,441,751
Advanced Scientific Computing	4,770,000
Subtotal	97,675,751
Decreases:	
Scientific, Technological and International Affairs	-6,100,000
Program Development and Management	-789,000
Subtotal	-6,889,000
FY 1986 Obligated Level	$1,397,750,000

U.S. ANTARCTIC PROGRAM ACTIVITIES APPROPRIATION

ANALYSIS OF CHANGES IN OBLIGATED LEVELS

FY 1984—FY 1986

	Obligations
FY 1984 Obligated Level	$102,387,704
FY 1985:	
Increases:	
U.S. Antarctic Research Program	567,196
Operations Support	7,943,396
Subtotal	8,510,592
FY 1985 Obligated Level	110,898,296
FY 1986:	
Increases:	
U.S. Antarctic Research Program	500,000
Operations Support	8,701,704
Subtotal	9,201,704
FY 1986 Obligated Level	$120,100,000

National Science Foundation

SCIENCE AND ENGINEERING EDUCATION ACTIVITIES APPROPRIATION

ANALYSIS OF CHANGES IN OBLIGATED LEVELS

FY 1984—FY 1986

	Obligations
FY 1984 Obligated Level	$57,443,382
FY 1985:	
Increases:	
Research Career Development	6,988,671
College Science Instrumentation	5,000,000
Teacher Enhancement and Informal Science Education	13,109,598
Studies and Program Assessment	190,916
Subtotal	25,289,185
Decrease:	
Material Development and Research	-732,567
FY 1985 Obligated Level	82,000,000
FY 1986 Obligated Level	$82,000,000

National Science Foundation

SPECIAL FOREIGN CURRENCY APPROPRIATION

ANALYSIS OF CHANGES IN OBLIGATED LEVELS

FY 1984—FY 1986

	Obligations
FY 1984 Obligated Level	$2,910,776
FY 1985:	
Decrease:	
Research and Related Activities	-73,319
FY 1985 Obligated Level	2,837,457
FY 1986:	
Decrease:	
Research and Related Activities	-1,837,457
FY 1986 Obligated Level	$1,000,000

National Science Foundation

PERCENTAGE DISTRIBUTION OF TOTAL OBLIGATIONS

FY 1984—FY 1986

	Actual FY 1984	*Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*
Research and Related Activities				
Mathematical and Physical Sciences	27.2	27.7	26.4	26.8
Engineering	9.8	9.8	10.0	10.6
Biological, Behavioral and Social Sciences	17.1	16.9	16.8	17.0
Astronomical, Atmospheric, Earth and Ocean Sciences	25.1	24.9	23.4	23.2
Scientific, Technological and International Affairs	2.8	3.1	3.0	2.4
Advanced Scientific Computing	0.5	—	2.7	2.9
Program Development and Management	5.1	4.7	4.7	4.4
Subtotal	87.6	87.1	87.0	87.3
U.S. Antarctic Program				
U.S. Antarctic Research Program	0.8	0.7	0.7	0.7
Operations Support	7.0	7.0	6.7	6.8
Subtotal	7.8	7.7	7.4	7.5
Science and Engineering Education				
Research Career Development	1.6	1.4	1.8	1.7
College Science Instrumentation	—	—	0.3	0.3
Material Development and Research	1.8	1.8	1.5	1.4
Teacher Enhancement and Informal Science Education	0.9	1.7	1.7	1.6
Studies and Program Assessment	0.1	0.1	0.1	0.1
Subtotal	4.4	5.0	5.4	5.1
Special Foreign Currency	0.2	0.2	0.2	0.1
Total, NSF	100.0	100.0	100.0	100.0

National Science Foundation

SUMMARY OF OBLIGATIONS BY MAJOR OBJECT CLASSIFICATION

Object	*Actual FY 1984*	*Budget Request FY 1985*	*Current Plan FY 1985*	*Estimate FY 1986*	*Difference FY 1986/85*
Research and Related Activities					
Personnel Compensation	$44,746,074	$46,514,000	$46,402,000	$45,720,000	-$682,000
Personnel Benefits	4,572,932	4,728,000	4,807,000	4,661,000	-146,000
Travel and Transportation of Persons	3,056,876	3,500,000	2,935,000	3,000,000	65,000
Transportation of Things	231,749	330,000	310,000	295,000	-15,000
Rents and Communications	7,617,026	8,720,000	8,185,500	8,085,300	-100,200
Printing and Reproduction	451,410	600,000	435,000	435,000	—0—
Other Contractual Services:					
Program Contracts	160,609,688	167,037,000	184,204,864	197,850,000	13,645,136
Program Development and Management Contract Services	3,430,122	3,571,000	4,292,500	3,877,900	-414,600
Supplies and Materials	624,938	900,000	785,000	709,800	-75,200
Equipment	1,519,251	2,009,000	2,507,000	3,086,000	579,000
Grants, Subsidies and Contributions:					
Program Grants	917,307,684	1,070,273,000	1,052,069,385	1,130,000,000	77,930,615
Program Development and Management Grants	6,254	30,000	30,000	30,000	—0—
Subtotal, Research and Related Activities	1,144,174,004	1,308,212,000	1,306,963,249	1,397,750,000	90,786,751
U.S. Antarctic Program					
Program Contracts	91,133,056	105,580,000	98,781,296	107,600,000	8,818,704
Program Grants	11,254,648	9,500,000	12,117,000	12,500,000	383,000
Subtotal, U.S. Antarctic Program	102,387,704	115,080,000	110,898,296	120,100,000	9,201,704
Science and Engineering Education Activities					
Program Contracts	1,436,085	2,000,000	3,000,000	3,000,000	—0—
Program Grants	56,007,297	73,700,000	79,000,000	79,000,000	—0—
Subtotal, Science and Engineering Education Activities	57,443,382	75,700,000	82,000,000	82,000,000	—0—
Special Foreign Currency					
Travel and Transportation of Persons	207,376	100,000	100,000	200,000	100,000
Program Contracts	50,929	170,000	150,000	150,000	—0—
Program Grants	2,652,471	2,530,000	2,587,457	650,000	-1,937,457
Subtotal, Special Foreign Currency	2,910,776	2,800,000	2,837,457	1,000,000	-1,837,457
Total, NSF	**$1,306,915,866**	**$1,501,792,000**	**$1,502,699,002**	**$1,600,850,000**	**$96,150,998**

NATIONAL SCIENCE FOUNDATION

RESEARCH AND RELATED ACTIVITIES

For necessary expenses in carrying out the purposes of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1875), title IX of the National Defense Education Act of 1958 (42 U.S.C. 1876-1879), and the Act to establish a National Medal of Science (42 U.S.C. 1880-1881); services as authorized by 5 U.S.C. 3109; maintenance and operation of aircraft and purchase of flight services for research support; hire of passenger motor vehicles; not to exceed $2,500 for official reception and representation expenses; uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901-5902); rental of conference rooms in the District of Columbia; and reimbursement of the General Services Administration for security guard services; [$1,301,912,000] to remain available until September 30, [1986]: *Provided*, That of the funds appropriated in this Act, or from funds appropriated previously to the Foundation, not more than [$70,302,000] shall be available for program development and management in fiscal year [1985]: *Provided further*, That contracts may be entered into under the program development and management limitation in fiscal year [1985] for maintenance and operation of facilities, and for other services, to be provided during the next fiscal year: *Provided further*, That receipts for scientific support services and materials furnished by the National Research Centers and other National Science Foundation supported research facilities may be credited to this appropriation: *Provided further*, That to the extent that the amount appropriated is less than the total amount authorized to be appropriated for included program activities, all amounts, including floors and ceilings, specified in the authorizing Act for those program activities or their subactivities shall be reduced proportionally[: *Provided further*, That not to exceed $9,000,000 shall be available for the very long baseline array and such funds shall not be obligated before April 1, 1985: *Provided further*, That the Foundation is authorized to indemnify grantees, contractors, and subcontractors associated with the ocean drilling program under the provisions of section 2354 of title 10 of the United States Code, with all approvals and certifications required thereby made by the Director of the National Science Foundation.]

acquisition of one aircraft;

$1,397,750,000

1987

$69,900,000

1986

1986

Provided further, that notwithstanding the provisions of the Small Business InnovationAct, Public Law 97-219, the rate authorized in fiscal year 1986, for carrying out the Small Business Innovation Research Program shall not exceed the rate authorized for fiscal year 1985 for carrying out this program.

(Department of Housing and Urban Department-Independent Agencies Appropriation Act, 1985.)

UNITED STATES ANTARCTIC PROGRAM ACTIVITIES

For necessary expenses in carrying out the research and operational support for the U.S. Antarctic Program pursuant to the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1875); maintenance and operation of aircraft and purchase of flight services for research and operations support; maintenance and operation of research ships and charter or lease of ships for research and operations support; hire of passenger motor vehicles; not to exceed $1,000 for official reception and representation expenses; [$110,080,000], to remain available until expended: *Provided*, That receipts for support services and materials provided to individuals for non-Federal activities may be credited to this appropriation: *Provided further*, That no funds in this account shall be used for the purchase of aircraft; (Department of Housing and Urban Department-Independent Agencies Appropriation Act, 1985.)

$120,100,000

Provided further, that notwithstanding the provisions of the Small Business Innovation Act, Public Law 97-219, the rate authorized in fiscal year 1986 for carrying out the Small Business Innovation Research Program shall not exceed the rate authorized for fiscal year 1985 for carrying out this program.

AND ENGINEERING

SCIENCE EDUCATION ACTIVITIES

$50,550,000 — 1987

For necessary expenses in carrying out science education programs and activities pursuant to the purposes of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1875), including award of graduate fellowships, services as authorized by 5 U.S.C. 3109, and rental of conference rooms in the District of Columbia, [$87,000,000], to remain available until September 30, [1986]: *Provided*, That to the extent that the amount of this appropriation is less than the total amount authorized to be appropriated for included program activities, all amounts, including floors and ceilings, specified in the authorizing Act for those program activities or their subactivities shall be reduced proportionally[: *Provided further*, That $5,000,000 shall be transferred from funds provided under this head to and merged with funds made available under "Research and related activities" for the purpose of conducting research on teaching and learning: *Provided further*, That $2,000,000 shall be made available for a contract to develop a science education plan and management structure for the Foundation.] (Department of Housing and Urban Department-Independent Agencies Appropriation Act, 1985.)

SCIENTIFIC ACTIVITIES OVERSEAS (SPECIAL FOREIGN CURRENCY PROGRAM)

$1,000,000 — 1987

For payments in foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States, for scientific activities, as authorized by law, [$2,800,000], to remain available until September 30, [1986]: *Provided*, That this appropriation shall be available in addition to other appropriations to the National Science Foundation for payments in the foregoing currencies. (Department of Housing and Urban Department-Independent Agencies Appropriation Act, 1985.)